UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF TEXAS
WACO DIVISION

CASTLEMORTON WIRELESS, LLC, ***Plaintiff,*** v. **NEWELL BRANDS INC. AND BRK BRANDS, INC.,** ***Defendants.***	**Civil Action No._________** **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Castlemorton Wireless, LLC ("Castlemorton") brings this action and makes the following allegations of patent infringement relating to U.S. Patent No.: 7,835,421 (the "'421 patent" or the "patent-in-suit"). Defendants Newell Brands Inc. and BRK Brands, Inc. (collectively, "Newell" or "Defendant") infringe the '421 patent in violation of the patent laws of the United States of America, 35 U.S.C. § 1 *et seq*.

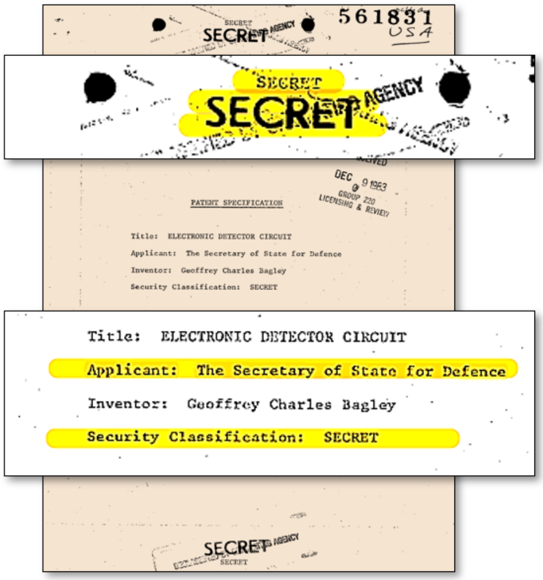
INTRODUCTION

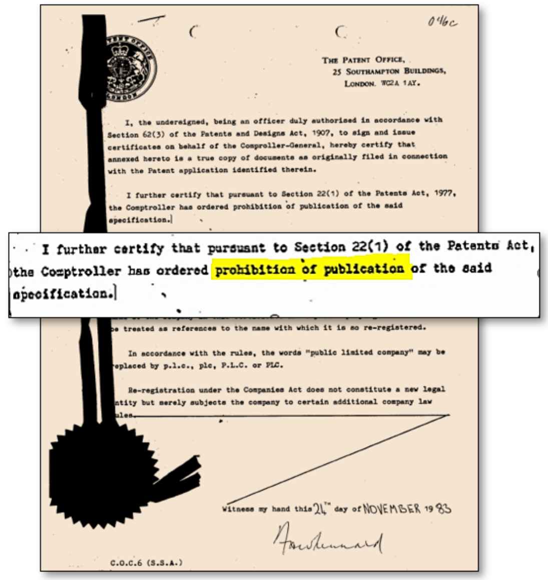
1. This case arises from Newell's infringement of the '421 patent. The '421 patent claims priority to United Kingdom Patent App. No. 8300076, dated January 4, 1983.

2. The '421 patent arose from the work of Geoffrey Bagley, a researcher at the United Kingdom's Ministry of Defence. The '421 patent discloses inventions relating to the detection of a carrier frequency of a direct spread spectrum signal ("DSSS") in wireless communication.

3. The inventions disclosed in the '421 patent were breakthroughs in the field of carrier signal detection. In fact, the disclosures in the '421 patent were considered so novel and important by the British and United States governments that secrecy orders precluded publication of the patented inventions for over twenty-five years. The below excerpt from the file history of

the '421 patent shows the United Kingdom Secretary of State's Secrecy Order pursuant to Section 22(1) of the United Kingdom's Patent Act of 1977.



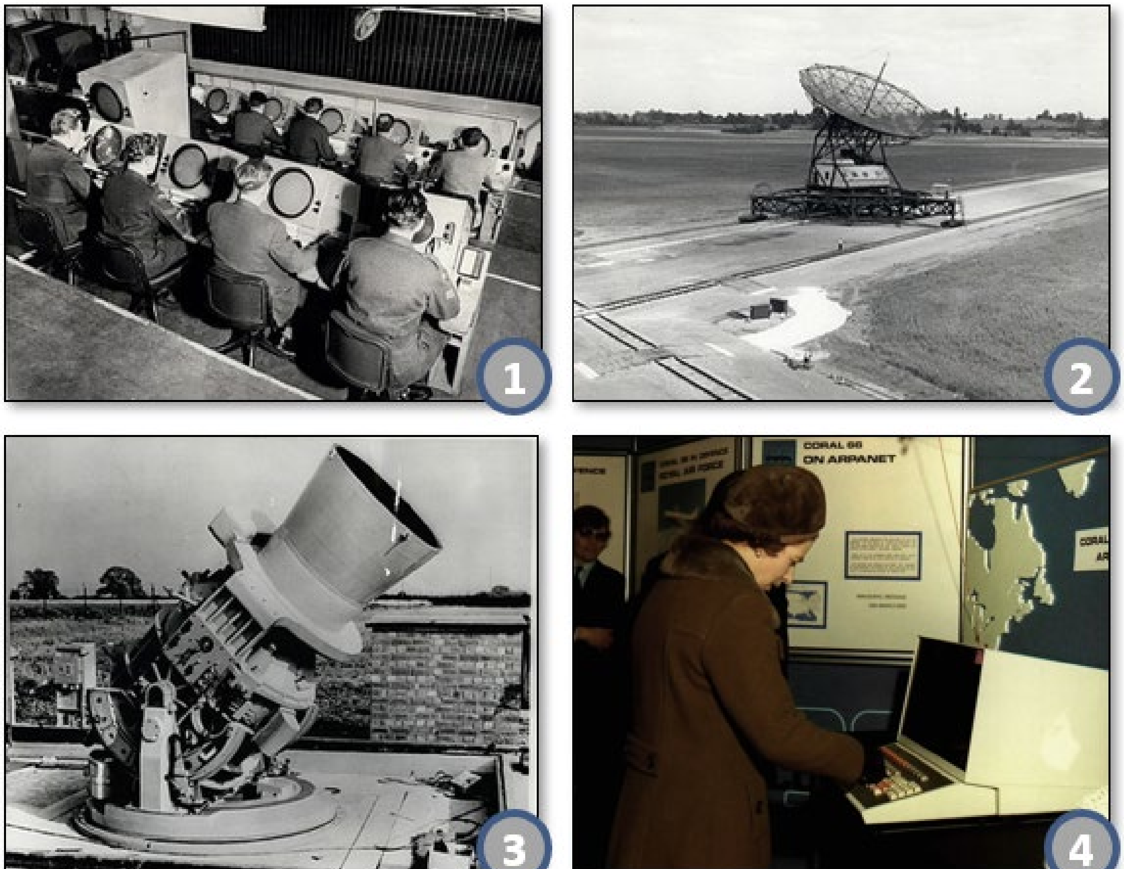


'421 Patent File History, Certified Copy of Foreign Priority Application (November 24, 1983) (emphasis added) ("I further certify that pursuant to Section 22(1) of the Patents Act, 1977, the Comptroller has ordered prohibition of publication of the said specification."); *'421 Patent File History,* Patent Specification Cover Page (December 9, 1983) (showing that the '421 Patent was applied for by the British Secretary of State for Defence and designated "Secret.").

4. The '421 patent was developed by Geoffrey Bagley of the Royal Signals and Radar Establishment ("RSRE"), a scientific research organization within the Ministry of Defence of the United Kingdom. The RSRE was the primary center for research and development of electronic devices and telecommunications technologies for the United Kingdom's Ministry of Defence.[1] As described below, RSRE's focus on wireless communications, encryption, electronic circuitry, and satellite tracking led to groundbreaking advancements in dual-use technologies (scientific applications with civilian and military function).

---

[1] F.F. Barnes and B.R. Holeman, *The Transfer of Defence Research on Electronic Materials to the Civil Field,* Phil. Trans. R. Soc. Lond. Series A Vol. 322, No. 1567 at 335 (1987) ("The Royal Signals and Radar Establishment (RSRE) has for many years been the focus within the Ministry of Defence for research on electronic materials and devices.").



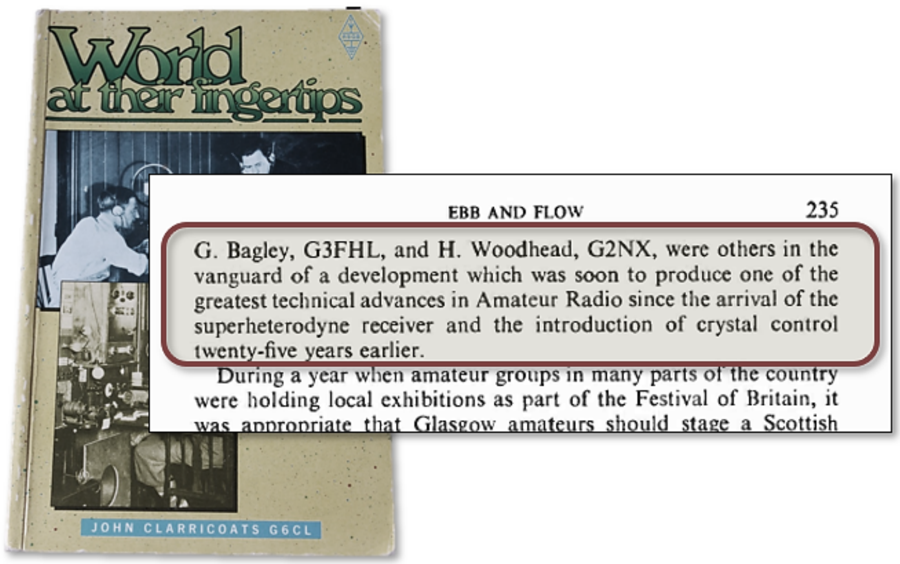
Images of RSRE's research programs: (1) the data extraction team at the RSRE (J.E.N. Hooper, *The Royal Radar Establishment,* ELECTRONICS AND POWER VOL. 13 Issue 5 at 154 (May 1967)); (2) tracking the Sputnik I rocket (I. Harris and R. Jastrow, *Re-Entry of the Sputnik I Rocket*, PLANET SPACE SCI., VOL. 1 at 1982 (1959) ("The observations on the Sputnik I rocket include a late radar echo obtained by the staff of the Royal Radar Establishment at Malvern, England.")); (3) an RSRE satellite camera for tracking satellites (Harrie Massie and M. O. Robin, HISTORY OF BRITISH SPACE SCIENCE at 261 (2009)); (4) email sent using ARPANET by Queen Elizabeth at the RSRE facility (Cade Metz, *How the Queen of England Beat Everyone to the Internet,* WIRED MAGAZINE (December 15, 2012) ("The date was March 26, 1976, and the ARPANET – the computer network that eventually morphed into the internet – had just come to the Royal Signals and Radar Establishment.").

5. The RSRE played a pivotal role in the development of technologies with broad civilian applications. Technologies developed by the RSRE included integrated circuits,[2] thermal

[2] *Mike Green, Dummer's Vision of Solid Circuits at the UK Royal Radar Establishment*, IEEE Annals of the History of Computing 35 at 56 (2013) ("Geoffrey W.A. Dummer of the British Royal Radar Establishment (RRE) described his idea of semiconductor 'solid circuits' at a conference in Washington, DC in 1952.").

imaging,[3] gas lasers,[4] and touch-screen user interfaces.[5]

6. Geoffrey Bagley, the inventor of the '421 patent, conducted his work on wireless signal communication systems at the RSRE. Geoffrey Bagley's research in the field of wireless transmissions has been recognized as contributing to the "greatest technological advances" in the field.



John Clarricoats, WORLD AT THEIR FINGERTIPS at 235 (1984) ("G. Bagley, G3FHL, and H. Woodhead, G2NX, were others in the vanguard of a development which was soon to produce one of the greatest technical advances in Amateur Radio since the arrival of the super heterodyne receiver and the introduction of crystal control twenty-five years earlier.").

7. In 1991, the RSRE was combined with other British defense research establishments into the United Kingdom Defence Research Agency ("DRA"). In 2001, the United Kingdom Ministry of Defence reorganized the research establishments of the DRA into QinetiQ,

[3] Steve Connor, *Military Moles Seek Technology Mountains*, NEW SCIENTIST at 39 (Aug. 7, 1986) ("The RSRE, for instance has pioneered thermal imaging to see in the dark, or in fog.").

[4] E.H Putley, *The History of the RSRE*, PHYS. TECHNOL., VOL. 16 at 11 ("Laser Development. RSRE discovered molecular gas laser in 1963 and invented the first far-infrared laser.").

[5] Yuval Mor, *Emotions Analytics to Transform Human-Machine Interactions*, WIRED MAGAZINE (Sept. 2013) ("In the mid-60s, E.A. Johnson at the Royal Radar Establishment in Malvern (UK) created the first touch screen; that has since sparked completely new user experiences via a plethora of innovative applications.").

a corporation majority owned by the United Kingdom government.[6]

8. QinetiQ, in partnership with Castlemorton, seeks to monetize the inventions developed by the RSRE. The value of QinetiQ's inventions has been confirmed by QinetiQ's history of successful intellectual property enforcement actions. *See QinetiQ Limited v. Samsung Telecommunic, et al*, Case. No. 03-cv-00221, Dkt. No. 251 (E.D. Tex. Jan. 14, 2005) (awarding QinetiQ $17,982,222 in damages against Samsung); *QinetiQ Limited v. Picvue Electronics, Ltd.,* Case No. 05-cv-00199, Dkt. No. 32 (E.D. Tex. Aug. 21, 2008) (entry of default judgment in the amount of $9,175,958 in favor of QinetiQ); and *QinetiQ Limited v. Oclaro Inc.,* Case No. 10-cv-00080, Dkt. No. 119 (N.D. Cal. Dec. 6, 2010) (Oclaro entered into a license agreement to the asserted QinetiQ patent valued at roughly $1.7 million).[7]

THE PARTIES

CASTLEMORTON WIRELESS, LLC

9. Castlemorton Wireless, LLC ("Castlemorton" or "Plaintiff") is a limited liability company organized under the laws of Delaware. Castlemorton was formed to obtain compensation for RSRE's pioneering work in the field of wireless communications.

10. Castlemorton pursues the reasonable royalties owed for Newell's use of the inventions claimed in the '421 patent, which arise from RSRE's groundbreaking technology.

NEWELL DEFENDANTS

11. Newell Brands Inc. is a Delaware corporation with its principal place of business at 6655 Peachtree Dunwoody Road, Atlanta, Georgia 30328. Newell Brands Inc. may be served

[6] R. Szweda, SILICON GERMANIUM MATERIALS AND DEVICES: A MARKET AND TECHNOLOGY OVERVIEW at 249 (2006) ("QinetiQ is a wholly UK government-owned pls that was formed in July 2001.").

[7] *See* OCLARO, INC. 2013 FORM 10-K at 52 (September 26, 2013) ("Legal settlements expense of $1.7 million during the year ended July 2, 2011 includes amounts recorded in connection with a confidential settlement agreement with QinetiQ Limited and for other legal settlements and related legal costs.").

through its registered agent Corporation Service Company d/b/a CSC – Lawyers Incorporating Service Company, 211 E. 7th Street, Suite 620, Austin, Texas 78701. Newell Brands Inc. is registered to do business in the State of Texas and has been since at least October 15, 2010.

12. BRK Brands, Inc. is a Delaware corporation with its principal place of business at 3901 Liberty Street, Illinois 60504. BRK Brands, Inc. may be served through its registered agent Corporation Service Company d/b/a CSC – Lawyers Incorporating Service Company, 211 E. 7th Street, Suite 620, Austin, Texas 78701. BRK Brands, Inc. is registered to do business in the State of Texas and has been since at least July 24, 1992. BRK Brands, Inc. is a wholly-owned subsidiary of Defendant Newell Brands, Inc.

13. Newell conducts business operations within the Western District of Texas. Defendant Newell Brands, Inc. maintains multiple facilities in the Western District of Texas, including at least a retail store in San Marcos, Texas and a warehouse and assembly facility in El Paso, Texas. Defendant BRK Brands, Inc. maintains a facility (pictured below) that conducts significant business operations for BRK Brands, Inc. at 1301 Joe Battle Blvd., El Paso, Texas 79936.

IMAGE OF DEFENDANT BRK BRANDS FACILITY IN EL PASO, TEXAS (2020).

JURISDICTION AND VENUE

14. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has exclusive subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338(a).

15. Upon information and belief, this Court has personal jurisdiction over Newell in this action because Newell has committed acts within the Western District of Texas giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Newell would not offend traditional notions of fair play and substantial justice. Newell, directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the patent-in-suit. Moreover, Defendants are registered to do business in the State of Texas, have stores and facilities in the State of Texas, and actively direct their activities to customers located in the State of Texas.

16. Venue is proper in this district under 28 U.S.C. §§ 1391(b)-(d) and 1400(b). Defendants are registered to do business in the State of Texas, have facilities throughout the State of Texas, have transacted business in the Western District of Texas and have committed acts of direct and indirect infringement in the Western District of Texas. Defendants maintain regular and established places of business within the Western District of Texas.

THE '421 PATENT

17. The United States Department of Defense and the United Kingdom Secretary of State ordered the '421 patent and its associated foreign and domestic applications be subject to "Secrecy Orders," as disclosure of the '421 patent would be "detrimental to the national security"[8]

---

[8] *See* 35 U.S.C. § 181 (1952).

and "prejudicial to the defence of the realm."[9]

18. Invention secrecy orders were first issued by the United States government in response to World War I. The Federal Government was concerned that "those inventions which are of most use to the Government during a time of war are also those which would, if known, convey useful information to the enemy."[10] These first secrecy orders were limited to the period of World War I. After World War I, the secrecy doctrine lay dormant for more than two decades. However, in 1940, in anticipation of the United States entry into World War II, the statute was renewed by the Act of July 1st, 1940.[11]

19. Following the end of World War II and with Cold War tensions mounting, Congress passed the Invention Secrecy Act of 1952. The 1952 Act created a year-long secrecy order, capable of indefinite renewal so long as the national interest required.[12]

20. On January 27, 1950, the United States and the Government of the United Kingdom of Great Britain and Northern Ireland entered into the Mutual Defence Assistance Agreement[13] in response to tensions with the Soviet Union. The agreement recognized the need to protect the secrecy of cutting-edge technology that could have important military, as well as civilian, capabilities and the need to advance the defense interests of the United States and the United Kingdom.

21. It was against this background that, on January 11, 1983, the United Kingdom

[9] *See* the UNITED KINGDOM PATENTS ACT § 22(1) (1977).

[10] S. Rep. No. 119, 65th Cong., 1st Sess. at 1 (1917).

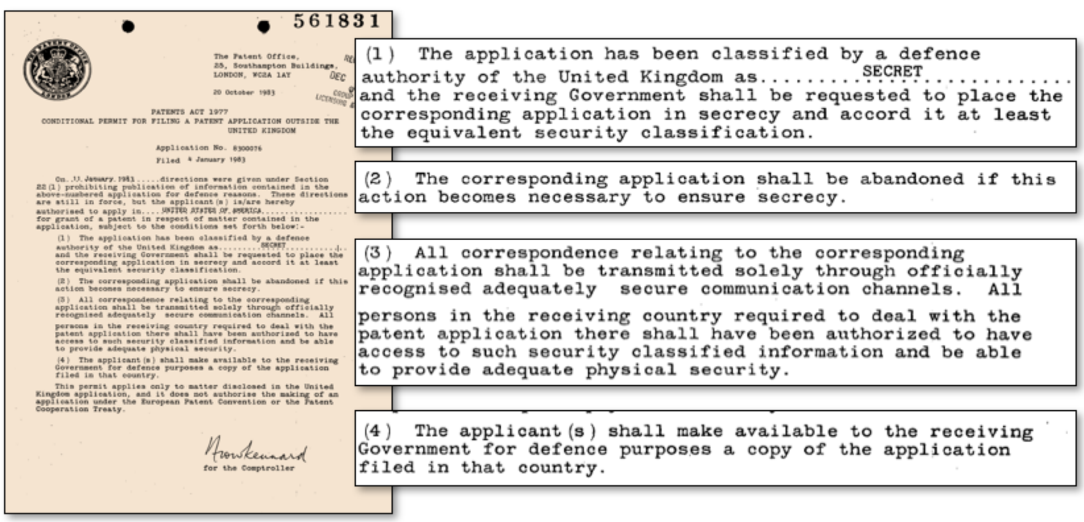
[11] Act of July 1, 1940, ch. 501, 54 Stat. 710 (1940).

[12] Invention Secrecy Act of 1952, ch. 4 §§10 & 11, 66 Stat. 3 (1952) (codified as amended at 35 U.S.C. §§ 181-188 (1994)).

[13] Interchange of Patent Rights and Technical Information, United States Treaties and Other International Acts Series 2773, UNITED STATES DEPARTMENT OF STATE, Publ. No. 5170 at 1 (Jan. 19, 1953).

Secretary of State ordered the foreign patent application to which the '421 patent claims priority be "classified by the defence authority of the United Kingdom as SECRET." The secrecy designation made by the United Kingdom prohibited the disclosure of United Kingdom Patent App. No. 8300076.

22. The designation of the '421 patent application as subject to a Secrecy Order was unusual and underscores the importance of the inventions disclosed in the '421 patent. In 2010, the final year that the '421 patent application was subject to a Secrecy Order, the United States Patent and Trademark Office ("USPTO") filed only 86 new secrecy orders[14] out of a total of 520,277 patent applications submitted to the USPTO.[15] Less than 0.016% (one out of every 6,049) patent applications was subject to a secrecy order in 2010.


561831

The Patent Office,
25, Southampton Buildings,
LONDON, WC2A 1AY

20 October 1983

PATENTS ACT 1977
CONDITIONAL PERMIT FOR FILING A PATENT APPLICATION OUTSIDE THE UNITED KINGDOM

Application No. 8300076
Filed 4 January 1983

On 11 January 1983 directions were given under Section 22(1) prohibiting publication of information contained in the above-numbered application for defence reasons. These directions are still in force, but the applicant(s) is/are hereby authorised to apply in UNITED STATES OF AMERICA for grant of a patent in respect of matter contained in the application, subject to the conditions set forth below:-

(1) The application has been classified by a defence authority of the United Kingdom as SECRET and the receiving Government shall be requested to place the corresponding application in secrecy and accord it at least the equivalent security classification.

(2) The corresponding application shall be abandoned if this action becomes necessary to ensure secrecy.

(3) All correspondence relating to the corresponding application shall be transmitted solely through officially recognised adequately secure communication channels. All persons in the receiving country required to deal with the patent application there shall have been authorized to have access to such security classified information and be able to provide adequate physical security.

(4) The applicant(s) shall make available to the receiving Government for defence purposes a copy of the application filed in that country.

This permit applies only to matter disclosed in the United Kingdom application, and it does not authorise the making of an application under the European Patent Convention or the Patent Cooperation Treaty.

for the Comptroller

'421 Patent File History, CONDITIONAL PERMIT FOR FILING A PATENT APPLICATION OUTSIDE THE UNITED KINGDOM (October 20, 1983) ("On 11 January 1983 directions were given under Section 22(1) prohibiting publication of information contained in the above-numbered application for defense reasons. These directions are still in force, but the applicant(s) is/are hereby authorized to

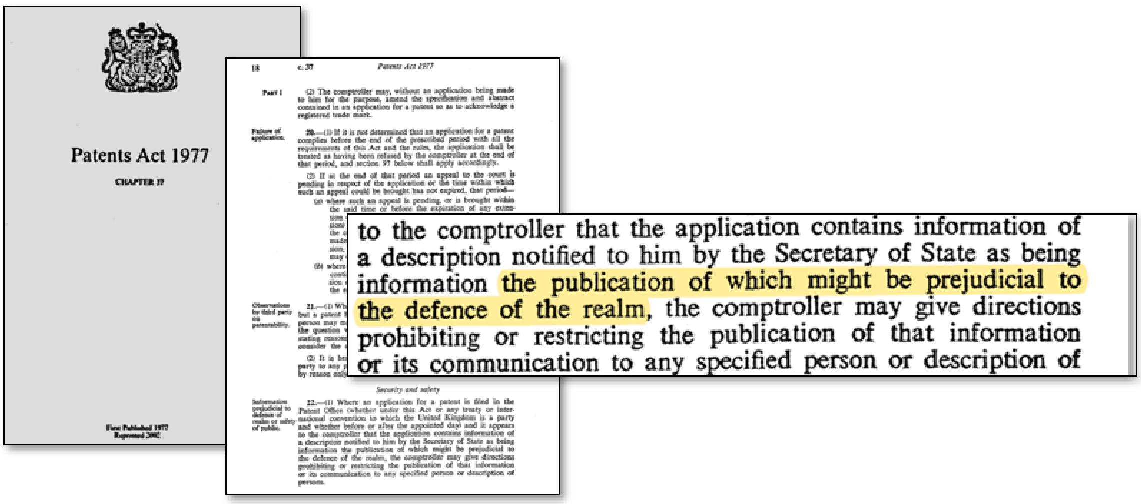
---

[14] *See* FREEDOM OF INFORMATION ACT (FOIA) REQUEST NO. F-13-0004 at 5 (October 23, 2012) (response to the FOIA request of Steven Aftergood of the Federation of American Scientists).

[15] *U.S. Patent Statistics Chart Calendar Years 1963-2018,* U.S. PATENT AND TRADEMARK OFFICE PATENT TECHNOLOGY MONITORING TEAM (2019), available at: https://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm

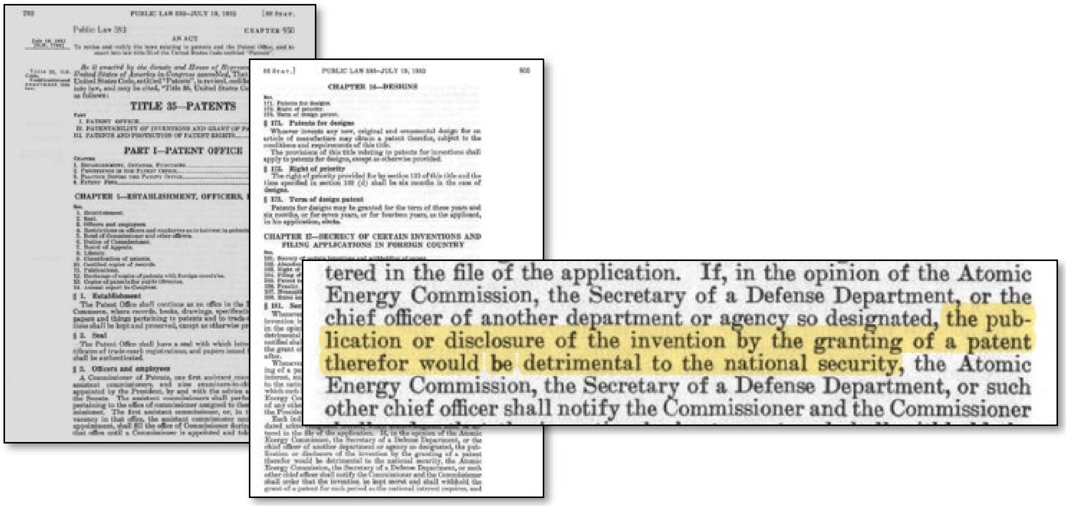
apply in UNITED STATES OF AMERICA for grant of a patent in respect of matter contained in the application, subject to the conditions set forth below.”).

23. The United Kingdom’s designation of the ‘421 patent application as subject to a Secrecy Order was made pursuant to the United Kingdom Patent Act of 1977. The United Kingdom’s Patent Act of 1977 requires, where a patent “application contains information” and where the “publication of which might be prejudicial to the defence of the realm,” the patent application be prohibited from publication.



THE UNITED KINGDOM PATENTS ACT § 22(1) (1977) (emphasis added) (“the publication of which might be prejudicial to the defence of the realm”).

24. On December 9, 1983, the United States Department of Defense issued a Secrecy Order covering the inventions disclosed in the ‘421 patent application, independently confirming the importance of the ‘421 patent. The United States Department of Defense found pursuant to “Title 35, United States Code (1952), section 181-188” that the ‘421 patent application contained subject matter where “unauthorized disclosure of which might be detrimental to the national security.” Based on this finding, the Department of Defense entered a Secrecy Order on December 9, 1983. The Secrecy Order provided for criminal penalties should the ‘421 patent application be published without “written consent” of the “Commissioner of Patent and Trademarks.” *See ‘421 Patent File History,* SECRECY ORDER (Filed December 9, 1983).

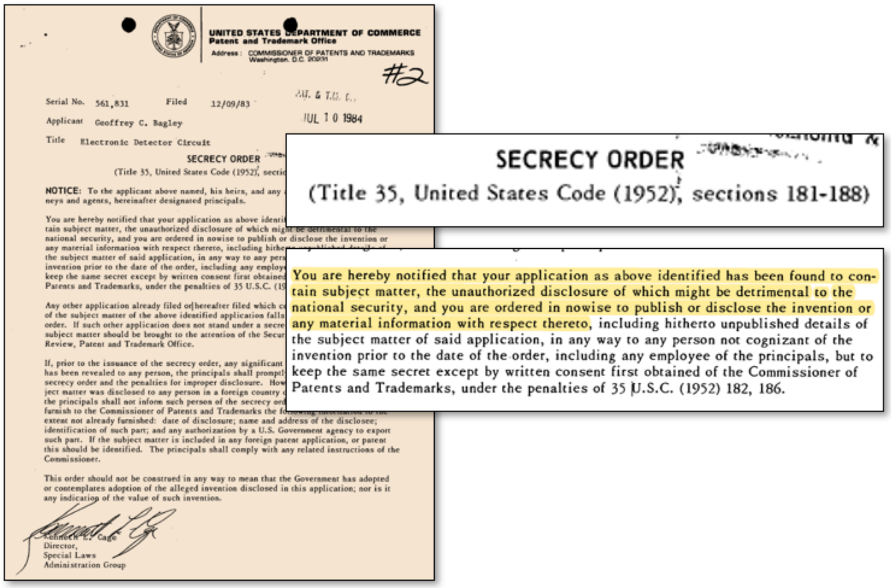


CHAPTER 17 OF THE PATENT ACT OF 1952, 35 U.S.C. § 181 (1952) (emphasis added) (Chapter 17 is sometimes referred to, by itself, as the Invention Secrecy Act because it was based on the Invention Secrecy Act of 1951, Pub. L. No. 82-256, 66 Stat. 3.).

25. The Patent Act of 1952 (under which the '421 patent application was designated as subject to a Secrecy Order) prohibits the publication of a patent application where the "publication or disclosure of the invention by the granting of a patent therefor would be detrimental to the national security." The determination to designate the '421 patent application as subject to a Secrecy Order was made pursuant to the United States Department of Defense Patent Act of 1952 in United States Code, Sections 181-188. The following excerpt from the file history of the '421 patent shows the issuance of the initial "Secrecy Order" by the United States Department of Defense was based on a finding that the disclosure of the inventions in the '421 patent application would be "detrimental to national security."

> You are hereby notified that your application as above identified has been found to contain subject matter, the unauthorized disclosure of which might be detrimental to the national security, and you are ordered in nowise to publish or disclose the invention or any material information with respect thereto.

'421 Patent File History, SECRECY ORDER (Filed December 9, 1983).



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS Washington, D.C. 20231

#2

Serial No. 561,831 Filed 12/09/83

Applicant Geoffrey C. Bagley

Title Electronic Detector Circuit

JUL 10 1984

SECRECY ORDER

(Title 35, United States Code (1952), sections 181-188)

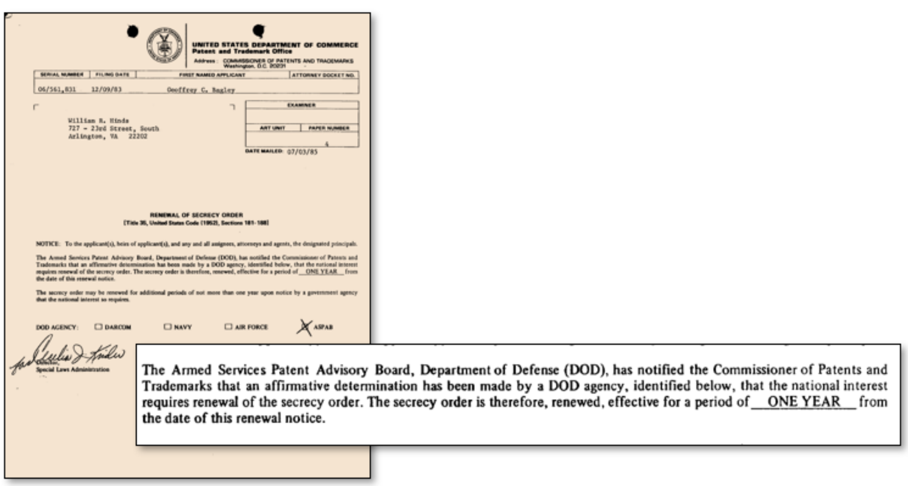
You are hereby notified that your application as above identified has been found to contain subject matter, the unauthorized disclosure of which might be detrimental to the national security, and you are ordered in nowise to publish or disclose the invention or any material information with respect thereto, including hitherto unpublished details of the subject matter of said application, in any way to any person not cognizant of the invention prior to the date of the order, including any employee of the principals, but to keep the same secret except by written consent first obtained of the Commissioner of Patents and Trademarks, under the penalties of 35 U.S.C. (1952) 182, 186.

This order should not be construed in any way to mean that the Government has adopted or contemplates adoption of the alleged invention disclosed in this application; nor is it any indication of the value of such invention.

Director, Special Laws Administration Group

'421 Patent File History, SECRECY ORDER (Filed December 9, 1983) (emphasis added) ("You are hereby notified that your application as above identified has been found to contain subject matter, the unauthorized disclosure of which might be detrimental to the national security, and you are ordered in nowise to publish or disclose the invention or any material information.").

26. Following the issuance of the Secrecy Order, the United States Armed Services Patent Advisor Board of the United States Department of Defense notified the United States Commissioner of Patents and Trademarks that it had made an "affirmative determination" that "the national interest require[d] renewal of the secrecy order."



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

06/561,831 12/09/83 Geoffrey C. Bagley

DATE MAILED: 07/03/85

RENEWAL OF SECRECY ORDER

(Title 35, United States Code (1952), Sections 181-188)

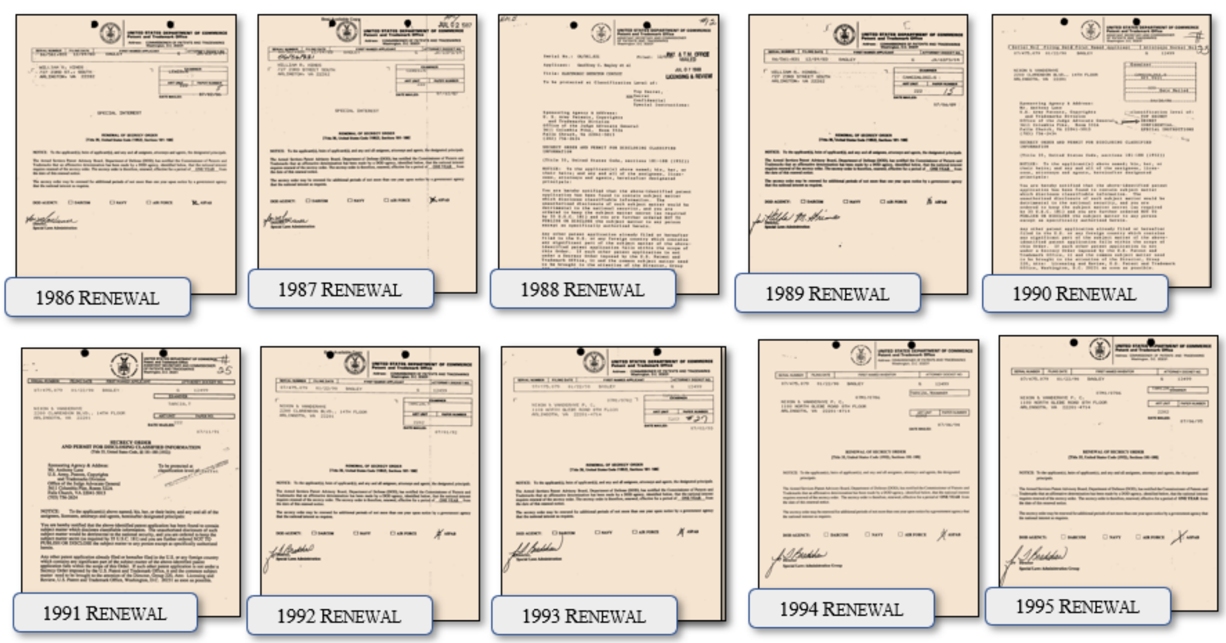
The Armed Services Patent Advisory Board, Department of Defense (DOD), has notified the Commissioner of Patents and Trademarks that an affirmative determination has been made by a DOD agency, identified below, that the national interest requires renewal of the secrecy order. The secrecy order is therefore, renewed, effective for a period of ONE YEAR from the date of this renewal notice.

DOD AGENCY: ☐ DARCOM ☐ NAVY ☐ AIR FORCE ☒ ASPAB

Special Laws Administration

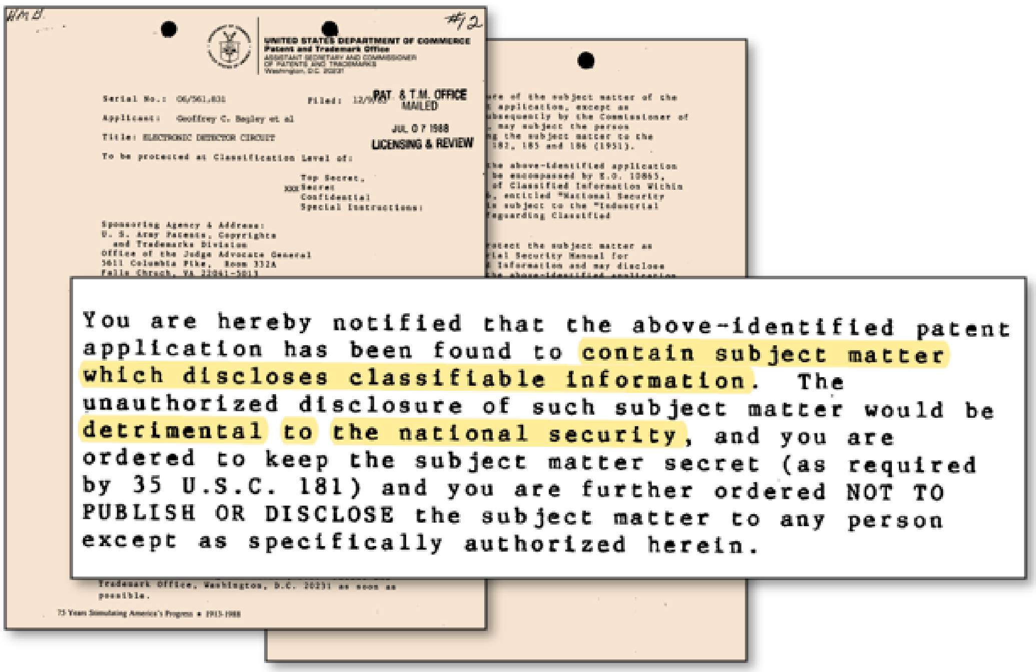
'421 Patent File History, RENEWAL OF SECRECY ORDER (Mailed July 3, 1985) ("The Armed Services Patent Advisory Board, Department of Defense (DOD), has notified the Commissioner of Patents and Trademarks that an affirmative determination has been made by a DOD agency, identified below, that the national interest requires renewal of the secrecy order.").

27. During the following decade, the United States Department of Defense issued renewals of the Secrecy Order prohibiting disclosure of the application leading to the '421 patent. Repeatedly, the United States determined that disclosure of the inventions taught in the '421 patent would be detrimental to national security should they be published. *See '421 Patent File History,* RENEWAL OF SECRECY ORDER (Mailed July 2, 1986); *'421 Patent File History,* RENEWAL OF SECRECY ORDER (Mailed July 2, 1987); *'421 Patent File History,* SECRECY ORDER AND PERMIT FOR DISCLOSING CLASSIFIED INFORMATION (July 7, 1988); *'421 Patent File History,* RENEWAL OF SECRECY ORDER (Mailed July 6, 1989); *421 Patent File History,* SECRECY ORDER AND PERMIT FOR DISCLOSING CLASSIFIED INFORMATION (Mailed July 11, 1991); *'421 Patent File History,* RENEWAL OF SECRECY ORDER (Mailed July 1, 1992); *421 Patent File History,* RENEWAL OF SECRECY ORDER (Mailed July 2, 1993); *'421 Patent File History,* RENEWAL OF SECRECY ORDER (Mailed July 6, 1994); and *'421 Patent File History,* RENEWAL OF SECRECY ORDER (Mailed July 6, 1995).



'421 Patent File History, SECRECY ORDER RENEWALS (1986-1995) (annotation added).

28. Each time the United States Department of Defense renewed the Secrecy Order, the patent applicant was notified that the '421 patent contained "subject matter which discloses classifiable information . . . the unauthorized disclosure of [which] . . . would be detrimental to the national security." An illustrative example of these annual renewal notifications is excerpted below.


You are hereby notified that the above-identified patent application has been found to contain subject matter which discloses classifiable information. The unauthorized disclosure of such subject matter would be detrimental to the national security, and you are ordered to keep the subject matter secret (as required by 35 U.S.C. 181) and you are further ordered NOT TO PUBLISH OR DISCLOSE the subject matter to any person except as specifically authorized herein.

'421 Patent File History, SECRECY ORDER AND PERMIT FOR DISCLOSING CLASSIFIED INFORMATION (July 7, 1988) (emphasis added) ("You are hereby notified that the above-identified patent application has been found to contain subject matter which discloses classifiable information. The unauthorized disclosure of such subject matter would be detrimental to the national security, and you are ordered to keep the subject matter secret (as required by 35 U.S.C. 181) and you are further ordered NOT TO PUBLISH OR DISCLOSE the subject matter to any person except as specifically authorized herein.").

THE INVENTIONS DISCLOSED IN THE '421 PATENT REFLECT GEOFFREY BAGLEY'S GROUNDBREAKING WIRELESS COMMUNICATIONS RESEARCH

29. Geoffrey Bagley was a pioneer in the field of wireless communication. Starting in the 1950's, he developed novel antenna designs and wireless signal processing systems. Geoffrey

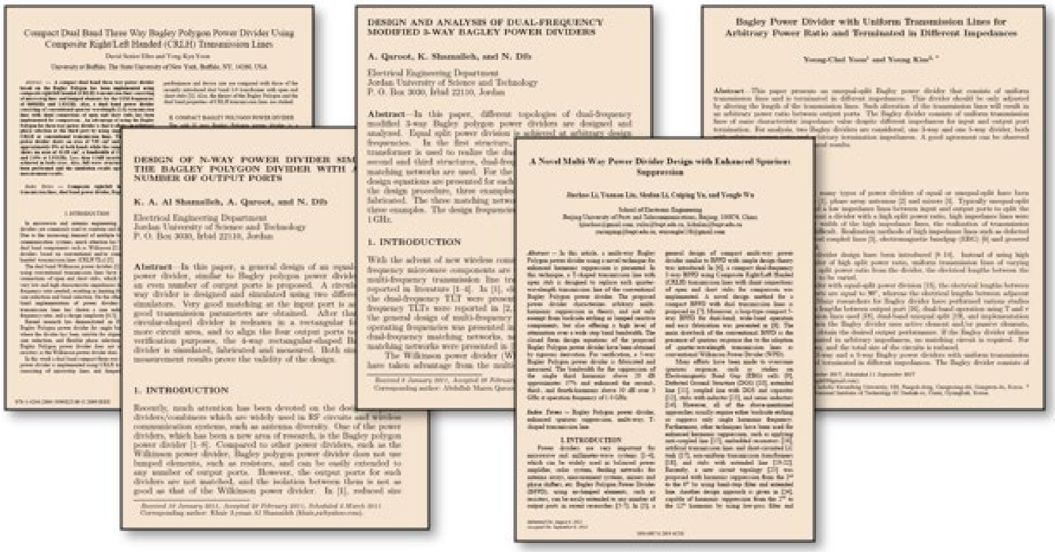
Bagley was a member of the Radio Society of Great Britain for over 70 years. *See* RADIO SOCIETY OF GREAT BRITAIN NEWSLETTER at 12 (January 2018).

WILLINGTON AMATEUR RADIO SOCIETY (A.R.S.) MEETING (Mid-1950s) (Geoffrey Bagley is picture standing second from the left in the rear of the photo).

30. Geoffrey Bagley's research centered on wireless communications systems including signal processing. Bagley wrote numerous papers in the field of wireless communications systems.[16] His research in the field has been widely cited by other researchers in

[16] *See, e.g.,* G.C. Bagley, *Radar Pulse-Compression By Random Phase-Coding*, THE RADIO AND ELECTRONIC ENGINEER VOL. 36, ISSUE 1 (July 1968); G.C. Bagley, *Radar Signal Loss Resulting From Sub-Optimal Phase Quadrature Processing*, THE RADIO AND ELECTRONIC ENGINEER VOL. 47, ISSUE 5 (May 1977); G.C. Bagley, *Digital Processing Of Signal Phase-Angle*, IEEE TRANS. AEROSPACE AND ELECTRONIC SYST. AES-9 (1973); G.C. Bagley, *Reducing Heterodyne Interference: A Survey Of The Problems Of Heterodyne Interference, With Particular Reference To Single-Sideband Operation*, R.S.G.B. BULLETIN VOL. 28 NO. 6 at 239 (December 1952); G.C. Bagley, *An Aerial Module For The UHF Band, Institution of Electrical Engineers, Conference on Aerospace Antennas, London, England, June 8-10, 1971*, PROCEEDINGS IEE CONFERENCE PUBLICATION, NO. 77 at 66 (1971) (identifying G.C. Bagley as being employed at the Royal Aircraft Establishment in Farnborough, England); G.C. Bagley, *A Survey Of Cancellation Versus Integration For Radar Clutter Reflection*, NASA STI/RECON TECHNICAL REPORT N (August 1974); G.C. Bagley, *Review Of Secondary Radar - Fundamentals and Instrumentation,* THE AERONAUTICAL JOURNAL VOL. 81 ISSUE 795 at 133 (March 1977); G.C. Bagley, *Review of Radar Precision and Resolution,* THE AERONAUTICAL JOURNAL VOL. 79 ISSUE 771 at 139 (March 1975); G.C. Bagley, *Review of Introduction to Adaptive Arrays,* THE

peer-reviewed journals.[17]



SELECTION OF RESEARCH PAPERS BY GEOFFREY BAGLEY (published 1968 to 1981).

31. Geoffrey Bagley's research informed his development of the inventions disclosed in the '421 patent. For example, his 1952 paper on reducing heterodyne interference examined ways that one could send a wireless communication over a channel that was used by other transmissions. A core problem Bagley identified was the need for a receiver to determine the

AERONAUTICAL JOURNAL VOL. 85 ISSUE 847 at 349 (September 1981); and G.C. Bagley, *Review of Radar Technology,* THE AERONAUTICAL JOURNAL VOL. 82 ISSUE 810 at 276 (June 1978).

[17] *See, e.g.*, J.M. Ross, *Coded Signal Design For A Transmitter Scanned Sonar,* JOURNAL OF SOUND AND VIBRATION Vol. 29 Issue 2 at 227 (July 1973); Herbert Matthews, SURFACE WAVE FILTERS: DESIGN, CONSTRUCTION, AND USE at 475 (1977); D.P. Morgan, *Surface Acoustic Wave Devices And Applications: 5. Signal Processing Using Programmable Non-Linear Convolvers,* ULTRASONICS Vol. 12 Issue 2 at 74 (March 1974); Matthews, Herbert, SURFACE WAVE FILTERS: DESIGN, CONSTRUCTION, AND USE (1977); Frank Amoroso, *Adaptive A/D Converter To Suppress CW Interference In DSPN Spread-Spectrum Communications*, IEEE TRANSACTIONS ON COMMUNICATIONS VOL. 31 ISSUE 10 at 1117 (1983); Frank Amoroso, *Adaptive A/D Converter To Suppress Co-Channel Constant Envelope Interference In A Mobile Digital Link*, TELECOMMUNICATION SYSTEMS VOL. 2 ISSUE 1 at 109 (1993); J.J. Hill, *Design Of Nonrecursive Digital Moving-Target-Indicator Radar Filter*s, ELECTRONICS LETTERS Vol. 8 Issue 14 at 359-360 (1972); P.F. Swaszek and **J.B.** Thomas, *Robust Vector Quantization,* OFFICE OF NAVAL RESEARCH REPORT NUMBER 10 at 14 (March 1983); and Frederick H. Raab and Jerome R. Waechter, *The Counting Phase Detector With VLF Atmospheric Noise*, IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS Issue 5 (Sept. 1977).

transmitted communication from other communications that were sent over the same wireless channel. Mr. Bagley would focus on these issues for much of his career. The need to disaggregate the wireless communication from other wireless transmissions would later be addressed by the inventions disclosed in the '421 patent.

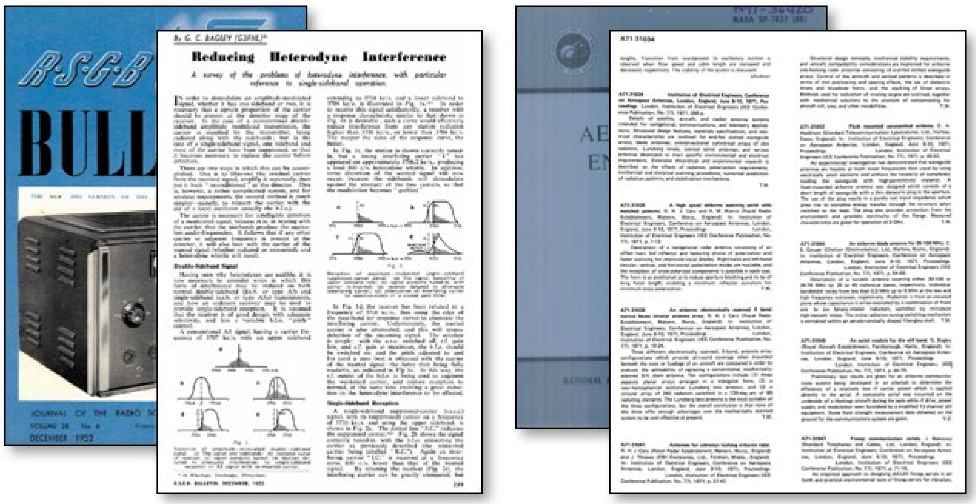
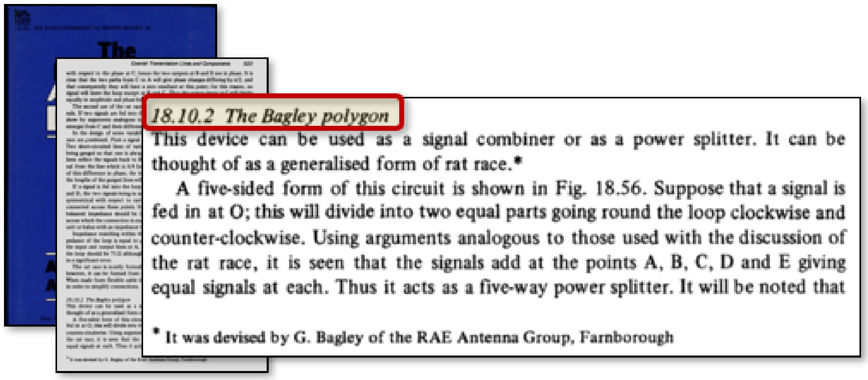


Image of Geoffrey Bagley's 1952 paper on heterodyne interference. *See* G.C. Bagley, *Reducing Heterodyne Interference: A Survey Of The Problems Of Heterodyne Interference, With Particular Reference To Single-Sideband Operation*, R.S.G.B. BULLETIN VOL. 28 NO. 6 at 239 (December 1952).

32. Geoffrey Bagley's work in wireless communication systems would lead to the development of the Bagley Polygon – an antenna developed to receive wireless communications while minimizing interference. In the following decades, the Bagley Polygon would be widely cited in research on wireless communications.[18] The following image shows two of the many

[18] *See e.g.*, David Senior Elles and Yong-Kyu Yoon, *Compact Dual Band Three Way Bagley Polygon Power Divider Using Composite Right/Left Handed (CRLH) Transmission Lines,* 2009 IEEE MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM DIGEST (2009); Iwata Sakagama, et al., *Compact Multi-Way Power Dividers Similar To The Bagley Polygon*, 2007 IEEE/MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM (2007); Khair Ayman Al Shamaileh, et al., *Design Of N-Way Power Divider Similar To The Bagley Polygon Divider With An Even Number Of Output Ports,* PROGRESS IN ELECTROMAGNETICS RESEARCH 20 (2011); Abdullah Mazen Qaroot, et al., *Design And Analysis Of Dual-Frequency Modified 3-Way Bagley Power Dividers*, PROGRESS IN ELECTROMAGNETICS RESEARCH 20 (2011); Youngchul Yoon and Young Kim, *Bagley Power Divider With Uniform Transmission Lines For Arbitrary Power Ratio And*

books that reference the Bagley Polygon used in wireless communications systems.

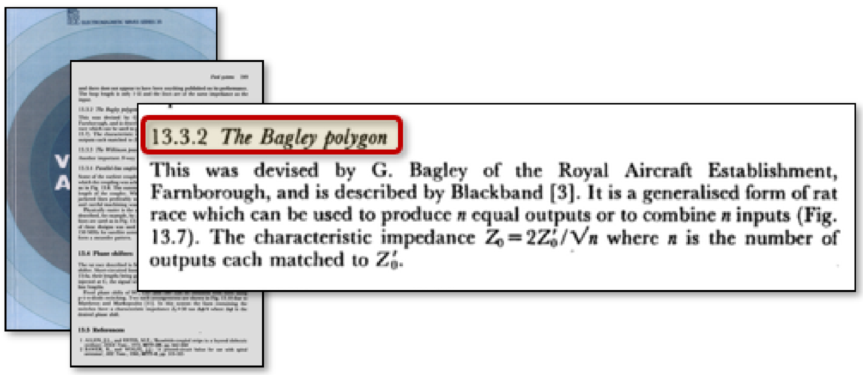


18.10.2 The Bagley polygon

This device can be used as a signal combiner or as a power splitter. It can be thought of as a generalised form of rat race.*

A five-sided form of this circuit is shown in Fig. 18.56. Suppose that a signal is fed in at O; this will divide into two equal parts going round the loop clockwise and counter-clockwise. Using arguments analogous to those used with the discussion of the rat race, it is seen that the signals add at the points A, B, C, D and E giving equal signals at each. Thus it acts as a five-way power splitter. It will be noted that

* It was devised by G. Bagley of the RAE Antenna Group, Farnborough



13.3.2 The Bagley polygon

This was devised by G. Bagley of the Royal Aircraft Establishment, Farnborough, and is described by Blackband [3]. It is a generalised form of rat race which can be used to produce n equal outputs or to combine n inputs (Fig. 13.7). The characteristic impedance $Z_0 = 2Z_0'/\sqrt{n}$ where n is the number of outputs each matched to Z_0'.

R.A. Burberry, VHF AND UHF ANTENNAS at 249 (1992) (emphasis added); A.W. Rudge et al, THE HANDBOOK OF ANTENNA DESIGN VOLUME 2 at 923 (1983) (emphasis added).

THE INVENTIONS DISCLOSED IN THE '421 PATENT REFLECT RSRE'S HISTORY OF GROUNDBREAKING WORK

33. The inventions taught in the '421 patent were developed at the Royal Signals and Radar Establishment in Malvern, Worcestershire in the United Kingdom. The Royal Signals and Radar Establishment was formed in 1970's through a merger of the United Kingdom's research

Terminated In Different Impedances, PROGRESS IN ELECTROMAGNETICS RESEARCH 77 (2017); Jiuchao li, et al., *A Novel Multi-Way Power Divider Design with Enhanced Spurious Suppression*, APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY JOURNAL 29.9 (2014); Roberto Gómez-García and Manuel Sánchez-Renedo, *Application Of Generalized Bagley-Polygon Four-Port Power Dividers To Designing Microwave Dual-Band Bandpass Planar Filters*, IEEE MTT-S INTERNATIONAL MICROWAVE SYMPOSIUM (2010); R.A. Burberry, VHF AND UHF ANTENNAS at 249 (1992) ("This was devised by G. Bagley of the Royal Aircraft Establishment, Farnborough."); A.W. Rudge, et al., THE HANDBOOK OF ANTENNA DESIGN VOLUME 2 at 923 (1983) ("It was devised by G. Bagley of the RAE Antenna Group, Farnborough."); and Sorin Voinigescu, HIGH-FREQUENCY INTEGRATED CIRCUITS at 426 (2013).

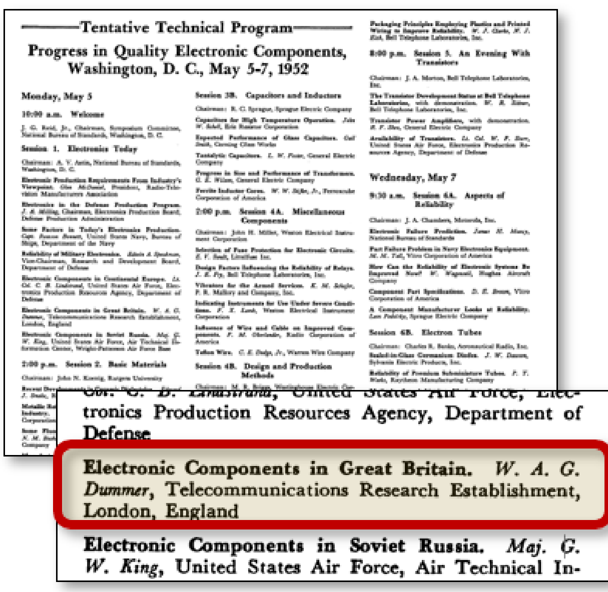
laboratories including the Royal Radar Establishment ("RRE") and the Services Electronic Research Laboratory ("SERL").

34. Contemporaneous to Geoffrey Bagley's work on wireless communication systems, researchers at the RSRE developed pioneering systems for thermal imaging. *See* Nic Fleming, *The Man Who Makes You See The Invisible,* BBC WEBSITE, (June 14, 2017), *available at*: https://www.bbc.com/future/article/20170614-thermal-imaging-reveals-the-hidden-heat-lost-from-your-home ("The first systems that generated images based on reflected light from the Moon, stars and sky were developed during the 1960s. British scientists played a leading role in the development of modern thermal imaging technologies, mostly those working at the Royal Radar Establishment (RRE) in Worcestershire, where Harper started as a student apprentice in 1967.").

35. In addition, the RSRE was one of the early developers of internet communication systems. In 1976, the RSRE was one of the first facilities to experiment with electronic messaging in what would later be called e-mail. Cade Metz, *How the Queen of England Beat Everyone To The Internet,* WIRE MAGAZINE (December 25, 2012) ("It was revolution in digital communication. But to the Queen, it was old hat. She could even say that the first message she sent across the ARPANET in 1976 wasn't without some real hacker cred. The Royal Signals and Radar Establishment has developed a programming language called Coral 66 – it's also mentioned on the wall, just to her left – and this was the subject of her missive.").

36. Further illustrating the novel work conducted at the RSRE is the RSRE's role in the initial conception of solid-state integrated circuits. In a 1952 paper, G.W.A. Dummer of the RSRE laid out the genesis of a solid-state integrated circuit. *See Solid Circuits: Glimpses into The Future at Malvern Components Symposium*, WIRELESS WORLD at 516 (November 1957) ("At the moment the solid circuit is little more than an idea. It is being investigated by the Royal Radar

Establishment at Malvern . . . A hypothetical example, described by G.W.A. Dummer of R.R.E. and displayed as a model in the Symposium exhibition, was a transistor flip-flop with two emitter-follower outputs."); *Mike Green, Dummer's Vision of Solid Circuits at the UK Royal Radar Establishment*, IEEE ANNALS OF THE HISTORY OF COMPUTING 35 at 56 (2013) ("Geoffrey W.A. Dummer of the British Royal Radar Establishment (RRE) described his idea of semiconductor "solid circuits" at a conference in Washington, DC in 1952."); and P.R. Morris, *A Review of UK Government Involvement in the Field of Semiconductor Technology Within the Research Establishments*, FACETS: NEW PERSPECTIVES ON THE HISTORY OF SEMICONDUCTORS at 279 (1997) ("The leading government research and development establishment involved in semiconductor work has been the Royal Signals and Radar Establishment (RSRE), based at Malvern, Worcestershire.").


Tentative Technical Program

Progress in Quality Electronic Components, Washington, D. C., May 5-7, 1952

Monday, May 5

Wednesday, May 7

tronics Production Resources Agency, Department of Defense

Electronic Components in Great Britain. *W. A. G. Dummer*, Telecommunications Research Establishment, London, England

Electronic Components in Soviet Russia. *Maj. G. W. King*, United States Air Force, Air Technical In-


"SOLID CIRCUITS"

Glimpses into the Future at Malvern Components Symposium

Heat Problems

G.W.A. Dummer, *Electronic Components in Great Britain,* SYMPOSIUM ON PROGRESS IN QUALITY ELECTRONIC COMPONENTS IRE, WASHINGTON D.C. (May 1952) (emphasis added) ("With the advent of the transistor and the work on semi-conductors generally, it now seems possible to envisage electronic equipment in a solid block with no connecting wires. The block may consist of layers of insulating, conducting, rectifying and amplifying materials, the electronic functions being connected directly by cutting out areas of the various layers.").

37. The first touchscreen interface was also developed by Geoffrey Bagley's contemporaries at RSRE. The development of these concomitant fundamental computer technologies informed Geoffrey Bagley's work on wireless communications, including the inventions disclosed in the '421 patent.

> The first device that we would recognize as a touchscreen today is believed to have been invented by Eric Arthur Johnson, an engineer at England's Royal Radar Establishment, in 1965. And it was created to improve air traffic control.
>
> In Johnson's day, whenever a pilot called in an update to his or her flight plan, an air traffic controller had to type a five-to seven-character call sign into a teleprinter in order to enter it on an electronic data display. That extra step was time-consuming and allowed for user error.

Brian Merchant, THE ONE DEVICE: THE SECRET HISTORY OF THE IPHONE at 270 (2017) (emphasis added) ("The first device that we would recognize as a touchscreen today is believed to be invented by Eric Arthur Johnson, an engineer at England's Royal Radar Establishment, in 1965.").

<u>THE '421 PATENT IS DIRECTED TO SOLVING LIMITATIONS IN CARRIER SIGNAL IDENTIFICATION</u>

38. U.S. Patent No. 7,835,421 (the "421 patent") entitled, *Electric Detector Circuit*, was filed on January 22, 1990, and claims priority to January 4, 1983. The '421 patent expires November 16, 2027. Castlemorton is the owner by assignment of all right, title, and interest in the '421 patent. A true and correct copy of the '421 patent is attached hereto as Exhibit A.

39. The '421 patent discloses a novel method and system for detecting the carrier signal frequency in wireless data signal communications.

40. The '421 patent teaches the detection of the carrier frequency direct-sequence spread spectrum signals ("DSSS"). DSSS is a spread spectrum technique initially developed for military wireless communications. The essential idea is to spread the wireless signal over a wider bandwidth to make jamming and interception more difficult.

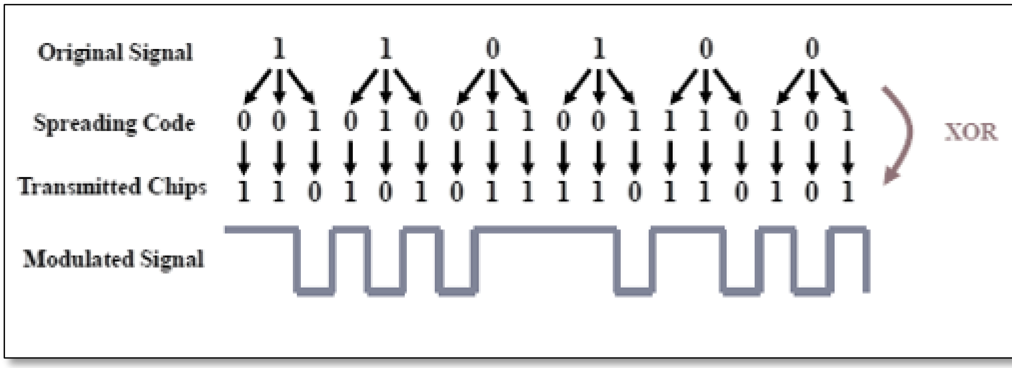
41. Spread spectrum was invented by Austrian-born actress Hedy Lamarr. Before fleeing Nazi Germany, she was married to an Austrian arms merchant and learned that existing narrowband radio communications were subject to jamming. Hedy Lamarr conceived of the idea of using a complex but predetermined hopping pattern to move the frequency of a control signal around. "Even if short bursts on a single frequency could be jammed, they would move around quickly enough to prevent total blockage." Matthew Gast, 802.11 WIRELESS NETWORKS: THE DEFINITIVE GUIDE at 237 (2005). In 1942, Hedy Lamarr and her husband, composer George Antheil, were granted a patent to the use of frequency hopping whereby a signal would be spread across multiple frequencies by hopping from one frequency to another.

42. The two primary forms of spread spectrum techniques are: frequency-hopping spread spectrum and direct-sequence spread spectrum. Frequency hopping spread spectrum is a form of spread spectrum in which the signal is broadcast over a seemingly random series of radio frequencies, hopping from frequency to frequency.

43. The '421 patent is directed at improving the functioning of DSSS, a more recent type of spread spectrum. In DSSS, each bit of an original signal is represented by multiple bits in the transmitting signal, using a spread code. The spreading code spreads the signal across a wider frequency band in direct proportion to the number of bits used. Therefore, a 10-bit spreading code spreads the signal across a frequency band that is 10 times greater than a 1-bit spreading code. One common way of implementing DSSS is to combine the original signal with the spreading code bit stream using an exclusive-OR ("XOR") operation. Typically, the XOR obeys the following rules:

$$0 \otimes 0 = 0 \qquad 0 \otimes 1 = 1 \qquad 1 \otimes 0 = 1 \qquad 1 \otimes 1 = 0$$

To see how a signal is then spread, assume the original signal contains the following bits 110100 and the spreading code is 001010011001110101. The resulting transmitted signal will be spread across a wider frequency band.



Example of Direct Squency Spread Spectrum (showing the original signal, spreadcode and modulated signal).

44. The receiver of the modulated DSSS signal then demodulates the signal by performing the inverse operation, the smeared-out signal is reconstituted as a narrow-band signal, and, more importantly, any narrow-band noise is smeared out so the signal shines through clearly.

45. At the time the ‘421 patent inventions were conceived, existing systems had difficulty identifying a received carrier signal from undesired transmission (*e.g.*, noise). For example, U.S. Patent No. 4,601,047, entitled *Code Division Multiplexer Using Direct Sequence Spread Spectrum Signal Processing*, which was cited in the prosecution of the ‘421 patent, identified the difficulty that existing prior art systems had in identifying the carrier signal from surrounding “undesired transmissions.”

> Because the correlation method of the invention involves a subtraction of a code sequence having an unassigned code sequence shift, all undesired transmission components (identified by the subscript "r") in the output VB (T) are perfectly rejected, whereas <u>in the prior art receiver,</u> the output VA (T) <u>involves contributions of the undesired transmissions</u> (having the subscript "j") as well as the desired transmissions (subscript "r").

U.S. Patent No. 4,601,047, col. 10:20-27 (emphasis added).[19]

46. Existing systems for receiving direct sequence spread spectrum signals at the time the '421 patent inventions were developed had further limitations including difficulty in distinguishing a carrier signal from signal noise as receivers of a modulated carrier signal would attempt to lock onto the noise. U.S. Patent No. 4,567,588, entitled, *Synchronization System For Use In Direct Sequence Spread Spectrum Signal Receiver*, which was cited in the prosecution of the '421 patent, describes this problem in identifying a carrier signal from noise.

> As another problem, <u>a direct sequence spread spectrum receiver does not readily distinguish between a signal and noise</u>, particularly since the incoming signal is a data modulated carrier that is spread by a pseudo-noise sequence. The receiver will thus tend to attempt to lock onto noise in the absence of a signal.

U.S. Patent No. 4,567,588, col. 4:43-48 (emphasis added).[20]

47. Existing systems also had difficulty correlating the received signal so that a carrier frequency could be identified. For example, U.S. Patent No. 4,561,089, entitled *Correlation Detectors For Use In Direct Sequence Spread Spectrum Signal Receiver*, which was cited in the prosecution of the '421 patent, identified the difficulty that existing systems had in identifying a carrier signal through correlation.

> [T]he degree of correlation between the predetermined transmitter and the receiver is determined by comparing the output of several correlation detectors having reference signals that are displaced in time from each other. An error signal is generated and applied to control receiver timing to perfectly align the code sequence shift of the receiver reference sequence to the code sequence shift of the predetermined transmitter. <u>A large number of adjustments of the correlation detector components, however, are required</u>. . . .<u>This creates a significant problem, both during initial calibration and during maintenance</u>.

U.S. Patent No. 4,561,089, col. 4:11-31 (emphasis added).[21]

---

[19] U.S. Patent No. 4,601,047 is assigned to Sangamo Weston Inc. and was filed on March 23, 1984.

[20] U.S. Patent No. 4,567,588 is assigned to Sangamo Weston, Inc. and was filed on March 23, 1984.

[21] U.S. Patent No. 4,561,089 is assigned to Santamo Weston, Inc. and was filed on March 23, 1984.

48. The '421 patent is directed at solving a need that was identified in patents that were contemporaneous to the inventions disclosed in the '421 patent. Specifically, U.S. Patent No. 4,538,281, entitled *Adaptive Acquisition of Multiple Access Codes*, which was cited in the prosecution of the '421 patent, describes the "substantial need" for systems that "enable the detection and acquisition of the coded signal."

> There is therefore a continuing and substantial need for systems and techniques which enable the detection and acquisition of the coded signal in multiple access communication systems using code division multiplexing which will improve strong signal performance without significant degrading of the weak signal performance.

U.S. Patent No. 4,538,281, col. 2:50-56 (emphasis added).[22]

49. The '421 patent is directed at a problem in the prior art wherein the carrier signal is difficult to identify unless the number of transmissions in the band was kept "low." For example, U.S. Patent No. 4,532,635, entitled *System And Method Employing Two Hop Spread Spectrum Signal Transmissions Between Small Earth Stations Via A Satellite And A Large Earth Station And Structure And Method For Synchronizing Such Transmission*, which was cited in the prosecution of the '421 patent, describes noise as making "error probability high" unless the number of transmissions is kept "low."

> In conventional spread spectrum the waveforms are not orthogonal to each other and a station receiving a desired spread spectrum transmission will also see many other spread spectrum transmissions. While the other spread spectrum transmissions will appear as noise such noise forms a background which makes error probability high unless the number of simultaneous users in the band are kept reasonably low.

U.S. Patent No. 4,532,635, col. 3:44-51 (emphasis added).[23]

50. Existing systems at the time the inventions disclosed in the '421 patent were developed were unable to "readily distinguish between signal and noise." U.S. Patent No.

---

[22] U.S. Patent No. 4,538,281 is assigned to Boeing Co. and was filed on May 6, 1982.

[23] U.S. Patent No. 4,532,635 is assigned to RCA Corp. and L3 Communications Corp. and was filed on August 19, 1983.

4,979,183, entitled *Transceiver Employing Direct Sequence Spread Spectrum Techniques*, which was filed several years after the '421 patent, described a drawback of existing systems for identifying a carrier signal in spread spectrum communication techniques, which was the difficulty in "synchronization between the transmitter and receiver."

> One of the drawbacks, however, in using spread spectrum communication techniques is that they often require elaborate, complex and expensive circuitry. Certain types of spread spectrum systems, such as direct sequence spread spectrum, also suffer from prohibitively long acquisition and decoding times. Since a direct sequence spread spectrum receiver does not readily distinguish between signal and noise, and, in particular, since the incoming signal is a data modulated carrier that is spread by a pseudonoise sequence, <u>synchronization between the transmitter and receiver is often troublesome</u>.

U.S. Patent No. 4,979,183, col. 2:23-34 (emphasis added).[24]

51. The issue of "false correlations" was a significant limitation in existing systems at the time the inventions disclosed in the '421 patent were conceived. For example, U.S. Patent No. 5,022,046, entitled *Narrowband/Wideband Packet Data Communication System*, which was filed roughly five years after the '421 patent, describes existing systems as having difficulty in synchronizing the receiver of a spread spectrum communication.

> <u>One of the more difficult problems in spread-spectrum communications is initial receiver acquisition of the signature sequence</u>. The problem is exacerbated in a packet system, since receiver synchronization must be reaccomplished at the beginning of each packet. False correlations with a time-shifted version of its own spreading sequence or with a portion of another user's sequence during packet transmission could cause loss of the packet.

U.S. Patent No. 5,022,046, col. 3:40-49 (emphasis added).[25]

---

[24] U.S. Patent No. 4,979,183 is assigned to Echelon Systems Corporation and was filed on March 23, 1989.

[25] U.S. Patent No. 5,022,046 is assigned to United Stated Air Force and was filed on April 14, 1989; *see also* U.S. Patent No. 4,774,715, col. 1:42-49 ("Basically, it is difficult to synchronize a locally generated PN decoding signal with a received signal as no significant indication of the degree of non-synchronization between such signals is available until the phase difference between the signals is minimal. The ability to reject multiple reflections of a signal consequently creates difficulties in synchronizing to a desired signal.").

52. Overcoming limitations in existing direct sequence spread spectrum devices for identifying a carrier signal and synchronizing the receiver and transmitter were described in patents from shortly after the priority date of the '421 patent as being a "significant design challenge" and "complex." For example, in U.S. Patent No. 5,365,550, entitled *Initial Synchronization And Tracking Circuits For Spread Spectrum Receivers*, the limitations in existing prior art is discussed.

> Direct sequence digital spread spectrum receivers present a significant design challenge in synchronizing the receiver clock with the transmitter clock, particularly under severe multipath and interference conditions. The sliding correlator technique of acquiring initial synchronization known in the prior art is typically used due to its inherently simple, yet predictable nature. Once synchronization is acquired, a Tau-dither technique known in the prior art is typically used to track the transmitter clock. However, multipath interference tends to result in rapid changing of perceived transmitter code clock rate, often resulting in a loss of synchronization. Attempts to improve the performance of these techniques have been quite complex and expensive.

U.S. Patent No. 5,365,550, col. 1:39-53 (emphasis added).[26]

53. At the time the '421 patent was developed, acquisition times for a carrier signal frequency were an impediment to efficient wireless communication systems. U.S. Patent Nos. 4,912,722, which was filed shortly after the '421 patent, describes the difficulties encountered by existing systems as they relate to acquisition times for a identifying a carrier signal.

> The problem remaining in the prior art is to provide a technique for spread spectrum transmissions which could eliminate the need for the expensive pseudo-noise code acquisition and tracking systems and thereby provide a low-cost, compact design spread spectrum transmitter/receiver. Present pseudo noise code acquisition systems also have long acquisition times and a further problem would be to provide a technique which can be useful in conjunction with existing code acquisition systems to provide a composite system with low acquisition times.

[26] U.S. Patent No. 5,365,550 is assigned to Westinghouse Air Brake Co. and was filed on July 18, 1991; *see also* U.S. Patent No. 5,428,647, col. 2:28-35 ("Therefore, a need exists for a synchronization technique which is simple enough to be inexpensively built for use by low tier communication unit while at the same time providing rapid synchronization for use by a communication unit operating in the high tier communication system. The high tier communication system needs rapid synchronization.").

U.S. Patent No. 4,912,722, col. 2:10-20 (emphasis added).[27]

54. The initial developers of the 802.11 set of wireless standards identified the need to address "delay" in identifying a carrier signal as one of the primary requirements for the 802.11 technology. The below excerpt from the 1992 minutes of the IEEE 802.11 MAC Ad-Hoc Committee shows the importance of this requirement. The first 802.11 standard would not be released for a further 6 years. Yet, even at this early date, the need to correlate DSSS signals with substantially zero relative time delay was a paramount concern. Unknown to the developers of the 802.11 standard, a technology to quickly detect a carrier frequency of a DSSS signal had already been invented. However, this technology (the technology claimed in the '421 patent) was subject to a national security order that prevented its disclosure.

IEEE P802.11 PAR
IEEE P802.11 Requirements
Summary is that there are two basic classes of service required:
- **Asynchronous: low avg transfer delay (as low as 2 msec transfer delay)**
- **Synchronous: low transfer delay variance (MSDU jitter) < = 10%**
- **IEEE 802.2 LLC support**
- **Coverage area < 100m or up to 1km**

Structure service to match the expected traffic
- **Async service for bursty traffic**
- **Sync service for "realtime" traffic**

Tentative Minutes of the IEEE 802.11 MAC Ad-Hoc Committee, DOC:IEEE P802.1/92-21 at 2 (January 14, 1992) (emphasis added).

[27] U.S. Patent No. 4,912,722 is assigned to Nokia Corporation and was filed on September 20, 1988; *see also* U.S. Patent No. 5,754,585, col. 2:20-26 ("Moreover, locking onto the received frequency and phase can take an unacceptably large amount of time, particularly in systems where time is of the essence, such as in certain time division multiple access (TDMA) systems in which only a relatively brief time slot is allocated for periodic communication between a transmitter and receiver.").

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 7,835,421

55. Castlemorton references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

56. Newell designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for detecting the carrier frequency of a DSSS signal.

57. Newell designs, makes, sells, offers to sell, imports, and/or uses the following products: Onelink Secure Connect Dual-Band Mesh Wi-Fi Router System (1042083 & 1042081), Onelink Secure Connect Tri-Band Mesh Wi-Fi Router System (1042396 & 1042082), Onelink Secure Connect Whole Home Wi-Fi Kit (AC1300 & AC3000), First Alert Onelink Wi-Fi Thermostat (Therm-500), First Alert Onelink Wi-Fi Environment Monitor with Battery Backup (GLOCO-500), First Alert Hardwired Wi-Fi Photoelectric Smoke and Carbon Monoxide Alarm with 10-Year Battery (AC10-500), First Alert Wi-Fi Photoelectric Smoke and Carbon Monoxide Alarm with 10-Year Battery (DC10-500), First Alert Smart Smoke + Carbon Monoxide Alarm – AC Power (2nd Generation) (1042135), First Alert Smart Smoke + Carbon Monoxide Alarm – Battery Operated (2nd Generation) (1042136), and the Luma Home Wi-Fi System (collectively, the "Newell '421 Product(s)").

58. One or more Newell subsidiaries and/or affiliates use the Newell '421 Products in regular business operations.

59. Newell has directly infringed and continues to directly infringe the '421 patent by, among other things, making, using, offering for sale, and/or selling technology for identifying a carrier frequency from a correlation signal, including but not limited to the Newell '421 Products.

60. The accused Newell products comply with the IEEE 802.11b and IEEE 802.11g standards. Specifically, the following products and referenced support show compliance with the IEEE 802.11b and IEEE 802.11g standards:

- Onelink Secure Connect Dual-Band Mesh Wi-Fi Router System (1042083 & 1042081)[28]
- Onelink Secure Connect Tri-Band Mesh Wi-Fi Router System (1042396 & 1042082)[29]
- Onelink Secure Connect Whole Home Wi-Fi Kit (AC1300 & AC3000)[30]
- First Alert Onelink Wi-fi Thermostat (Therm-500)[31]
- First Alert Onelink Wi-Fi Environment Monitor with Battery Backup (GLOCO-500)[32]
- First Alert Hardwired Wi-Fi Photoelectric Smoke and Carbon Monoxide Alarm with 10-Year Battery (AC10-500)[33]
- First Alert Wi-Fi Photoelectric Smoke and Carbon Monoxide Alarm with 10-Year Battery (DC10-500)[34]

---

[28] FCC TEST REPORT NO.: FR8N0502AC - FCC ID MXF-WRTQ-337 at 5 (November 26, 2018) ("Specification of the Equipment under Test (EUT) . . . Frequency Range (MHz) 2400-2483.5 | IEEE Std. 802.11b . . . 802.11b uses a combination of DSSS-DBPSK, DQPSK, DQPSK, CCK modulation.").

[29] FCC TEST REPORT NO.: FR8O3101-01AC - FCC ID MXF-WAPQ-245 at 5 (August 2, 2019) ("Specification of the Equipment under Test (EUT) . . . Frequency Range (MHz) 2400-2483.5 | IEEE Std. 802.11b . . . 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.").

[30] *Onelink Secure Connect Whole Home Wi-Fi Kit Product Page,* FIRST ALERT WEBSITE (last visited January 2021), *available at*: https://www.firstalert.com/product/onelink-secure-connect-whole-home-wi-fi-kit/ ("Technical Specs . . . MU-MIMO, Beamforming, IEEE 802.11 b/g/n/ac 2.4GHz").

[31] FCC TEST REPORT NO.: 314318 - FCC ID MUH-SKYPORT2 at 9 (January 27, 2015).

[32] FCC TEST REPORT NO. RF150528E05C – FCC ID TLZ-CU300 at 6 (April 29, 2016) ("General Description of EUT . . . IEEE 802.11 b/g/n WLAN Microcontroller Module . . . Modulation Tupe CCK, DQPSK, DBPSK for DSSS . . . Operating Frequency 2412 – 2462GHz").

[33] *First Alert Onelink Wi-Fi Smoke + Carbon Monoxide Alarm User's Manual Model: AC10-500*, FIRST ALERT ONELINK DOCUMENTATION at 17 (2015) ("This alarm supports wireless frequency of 2.4Ghz b/g/n. For best results, recommended to use with a 802.11 b/g/n router.").

[34] *First Alert Onelink Wi-Fi Smoke + Carbon Monoxide Alarm User's Manual Model: DC10-500*, FIRST ALERT ONELINK DOCUMENTATION at 10 (2015) ("Wi-Fi Frequency - This alarm supports wireless frequency of 2.4Ghz b/g/n. For best results, recommended to use with a 802.11 b/g/n router.").

- First Alert Smart Smoke + Carbon Monoxide Alarm – AC Power (2nd Generation) (1042135)[35]
- First Alert Smart Smoke + Carbon Monoxide Alarm – Battery Operated (2nd Generation) (1042136)[36]
- Luma Home Wi-Fi System[37]

61. By complying with the 802.11b and/or 802.11g standard, the Newell '421 Products necessarily infringe the '421 patent. The mandatory sections of the 802.11b and/or 802.11g standard require the elements required by certain claims of the '421 patent, including but not limited to claim 6 of the '421 patent. *Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications*, IEEE STD 802.11 – 2016 (December 7, 2016) (hereinafter the "IEEE STD. 802.11-2016") (The following sections of the 802.11b and 802.11g standards are relevant to Newell's infringement of the '421 patent: § 9.3.3.3 Beacon frame format; § 9.4.2.4 DSSS Parameter Set element; § 15.3.2 PPDU format; § 15.3.3 PHY field definitions; § 15.3.5 PHY data modulation and modulation rate change; § 15.3.7 Receive PHY; § 15.4.4.4 Spreading sequence; § 15.4.4.7 TX-to-RX turnaround time; § 15.4.4.8 RX-to-TX turnaround time; § 16.1.3 HR/DSSS PHY Functions; § 16.2.2.2 Long PPDU format; § 16.2.3.2 Long PHY SYNC Field; § 16.2.4 PHY/HR/DSSS PHY data scrambler and descrambler; § 16.2.5 Transmit PHY; § 16.2.6 Receive PHY; § 16.3.6 PHY operating specifications, general; § 16.3.6.4 Modulation and channel data rates; § 16.3.6.8 TX-to-RX turnaround time; and § 16.3.6.9 RX-to-TX turnaround time).

---

[35] *First Alert Onelink Smart Smoke & Carbon Monoxide Alarm User's Manual Model: 1042135,* FIRST ALERT ONELINK DOCUMENTATION at 17 (2018) ("Wireless Frequency - This alarm supports wireless frequency of 2.4Ghz, 802.11 b/g/n/ac router required.").

[36] *First Alert Onelink Smart Smoke & Carbon Monoxide Alarm User's Manual Model: 1042136,* FIRST ALERT ONELINK DOCUMENTATION at 10 (2018) ("Wireless Frequency: This alarm supports wireless frequency of 2.4Ghz. For best results, recommended to use with a 802.11 b/g/n/ac router.")

[37] *Luma User Guide – Experience Surround Wifi,* LUMA DOCUMENTATION at 26 (2016) ("Tech specs | Wireless IEEE 802.11 a/b/g/n/ac Simultaneous dual-band 2.4GHz and 5GHz").

62. The Newell '421 Products identify a carrier frequency in compliance with the IEEE 802.11b and/or IEEE 802.11g standards.[38] Newell documentation confirms that the Newell '421 Products comply with the IEEE 802.11b and IEEE 802.11g standards.

63. The Newell '421 Products identify the carrier frequency of a signal modulated using DSSS. The Newell '421 Products receive signal data modulated using DSSS. Specifically, the Newell '421 Products receive DSSS signals that fall within a frequency range. The frequency band that the Newell '421 Products are equipped to receive DSSS signals in is referred to as the 2.4 GHz band. The frequency of the DSSS signal in the 2.4 GHz band received by the Newell '421 Products is between 2400 MHz to 2483.5 MHz as specified in the IEEE 802.11b standard. "The DSSS PHY shall operate in the frequency range of 2.4 GHz to 2.4835 GHz." IEEE Std. 802.11-2016 at Sec. 15.4.4.2.

64. The identification of a carrier frequency of a DSSS signal that falls within a "band" is a described in the '421 patent specification. The '421 patent specification gives an example of determining a carrier frequency that is within a range of 3800 MHz to 4200 MHz (the patent describes this example as being "in the 4.0±0.02 GHz band." '421 patent, col. 3:14. Similarly, the Newell '421 Products receive DSSS signals in the 2.44175±.04175 GHz band. That the carrier frequency falls within a fixed range (as required in the 802.11b and 802.11g standards) is identical

[38] The IEEE 802.11g standard is backwards compatible with the IEEE 802.11b standard. Both standards dictate carrier frequency identification and demodulation in the same manner. *See* Ramia Babiker Mohammed Abdelrahman, Amin Babiker A. Mustafa, Ashraf A. Osman, *Comparison between IEEE 802.11a, b, g, n and ac Standards*, IOSR J. OF COMP. ENG'G VOL. 17, ISSUE 5 at 27 (2015) ("The standard 802.11g was ratified in 2003 as an IEEE standard for Wi-Fi wireless networking and it supports maximum network bandwidth of 54 Mbps compared to 11 Mbps for 802.11b. This standard operates at 2.4GHz frequency and bandwidth of 20MHz. This standard uses the OFDM or DSSS modulation schemes."); T. L. Singal, *Wireless Communications*, at 573 (TATA MCGRAW HILL EDUC. PRIVATE LTD. 2010) ("IEEE 802.11g is backward compatible with 802.11 and 802.11b standards by specifying the same modulation and framing schemes for 1, 2, 5.5, and 11 Mbps data rates.").

to the '421 patent disclosure which describes the receipt of a DSSS signal that falls within a fixed band.

65. Both the '421 patent and the Newell '421 Products perform carrier frequency identification by receiving a DSSS signal falling within a frequency band using one or more antennas. The '421 patent specification, in an illustrative embodiment, states that "An antenna 20 is arranged to receive signals in the 4.0+0.02 GHz band, and to supply the signals to a mixer." '421 patent, col. 3:13-15. The Newell '421 Products also use one or more antennas that receive DSSS signals falling within a band.

66. Although the DSSS signal received by the Newell '421 Products falls within a frequency band, the specific carrier frequency is not known. For example, the carrier frequency of the DSSS signal received by the Newell '421 Products can have one of 11 different carrier frequencies within the frequency band. Which of these 11 carrier frequencies the DSSS signal is modulated onto is unknown at the time the signal is received by the Newell '421 Products. The IEEE 802.11b standard requires that the carrier signal be suppressed. Specifically, the standard states "The RF carrier suppression, measured at the channel center frequency, shall be at least 15 dB below the peak sin(x)/x power spectrum. The RF carrier suppression shall be measured while transmitted a repetitive 01 data sequence with the scrambler disabled using DQPSK modulation." IEEE Std. 802.11-2016 at Sec. 15.4.5.9.

67. Analysis of the IEEE 802.11b standard identifies that the carrier signal can be unknown to the receiver until the receiver (e.g., a Newell '421 Product) performs carrier signal detection. The following excerpt describes the signals received as having unknown center frequencies – the center frequencies are the carrier frequency.

> of interest can normally be taken as known. On the other hand, at any given time, a wideband cognitive radio will sense a spectrum subband that can be wide enough to contain several channels belonging to possibly different active systems. For example, in the 2.4 GHz ISM band, there may be WiFi (IEEE 802.11b), Bluetooth, as well as other unknown signals such as microwave oven radiation. Another example is the WMTS systems operating in lower and upper L bands (1395–1400MHz and 1427–1432MHz, respectively): These bands may contain an unknown mix of utility telemetry signals, government radar signals, as well as radio astronomy signals [39]. Hence, signals to be sensed are certainly not homogeneous and may have unknown center frequencies within the subband, posing a significantly more complicated problem.

Sudharman K. Jayaweera, SIGNAL PROCESSING FOR COGNITIVE RADIOS at 430 (2015) (emphasis added).

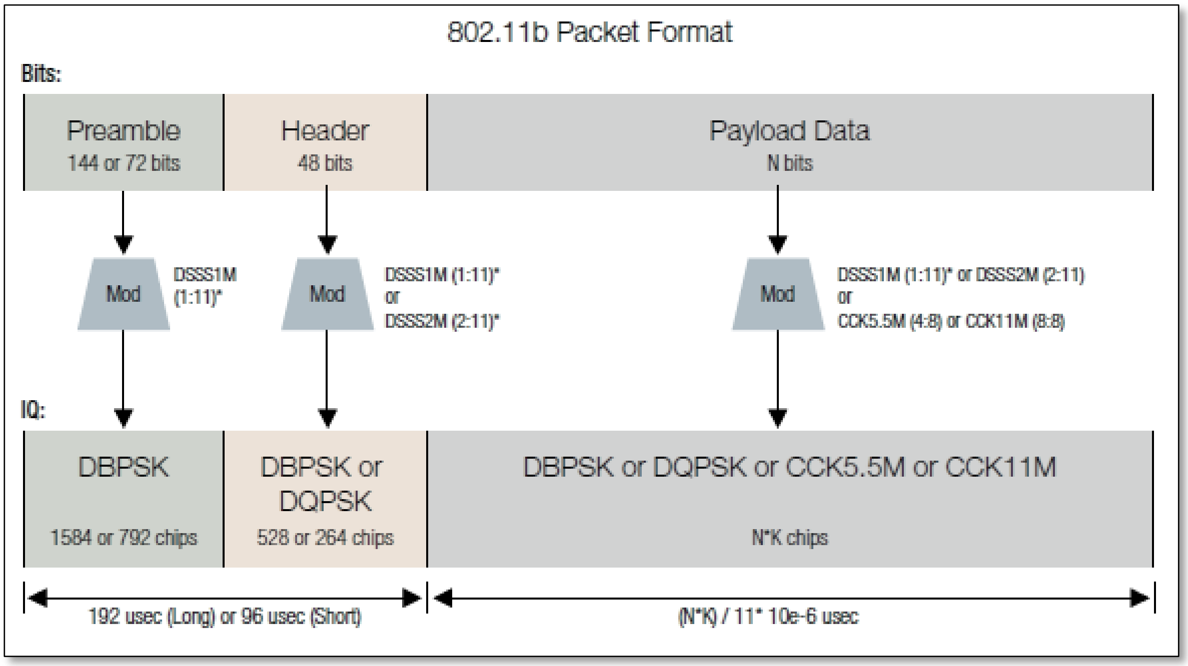
68. Further, the Newell '421 Products identify the carrier frequency from a number of frequencies in the 2.4 GHz band. Prior to conducting carrier frequency detection, the carrier frequency for the received DSSS signal is not known.

> The IEEE 802.11b Direct Sequence Spread Spectrum (DSSS) Physical layer delivers frames at 1, 2, 5.5, and 11 Mbps rates in the 2.4 GHz ISM band. The original 802.11 Clause 15 DSSS standard specified only 1 and 2 Mbps data rates using only long preambles. The only coding/modulation used in 802.11 Clause 15 is Barker code with DBPSK (1 Mbps) and DQPSK (2 Mbps). Figure 8.3 illustrates the construction of the DSSS PLCP Protocol Data Unit (PPDU), which includes a long preamble, the header, and the MPDU (PSDU) as specified in the 802.11 standard. The preamble and the header are both transmitted at 1 Mbps when using the long preamble format. The MPDU is transmitted at the data rate specified by the transmitting station (or access point). The preamble enables the receiver to synchronize to the incoming signal properly before the actual content of the frame arrives. The header provides information about the frame, and the PSDU is the MPDU the transmitting station is sending.

CERTIFIED WIRELESS ANALYSIS PROFESSIONAL OFFICIAL STUDY GUIDE (EXAM PW0-205) FIRST EDITION at 211 (2004) (emphasis added).

69. The Newell '421 Products perform the step of receiving modulated signals that comply with the 802.11b and/or 802.11g Packet Format. The modulated signals received by the Newell '421 Products are transmitted as DSSS Physical Layer Convergence Protocol ("PLCP") Protocol Data Unit ("PPDU"). The below diagram shows the structure of a PPDU received by the

Newell '421 Products. The PPDU received by the Newell '421 Products is comprised of a PLCP Preamble, PLCP Header, and MAC protocol data unit ("MPDU").



Wi-Fi: Overview of the 802.11 Physical Layer and Transmitter Measurements, TEKTRONIX PRIMER at 20 (November 2016).

70. The Newell '421 Products perform the step of subtracting the DSSS signal from a signal having a higher frequency than any frequency in the DSSS signal spectrum to produce DSSS signal frequency spectrum inversion. Spectrum inversion is completed by demodulating the data by a higher rate sequence of PN data. The higher rate sequence of PN data is known as the chip rate. This also has the effect of increasing the frequency bandwidth when modulated and decreasing the frequency bandwidth when demodulated so that the carrier frequency can be identified.

> The DSSS system provides a wireless LAN with both a 1 Mbit/s and a 2 Mbit/s data payload communication capability. According to the FCC regulations, the DSSS system shall provide a processing gain of at least 10 dB. <u>This shall be accomplished by chipping the baseband signal at 11 MHz with an 11-chip PN code</u>. The DSSS system uses baseband modulations of differential binary phase shift

> keying (DBPSK) and differential quadrature phase shift keying (DQPSK) to provide the 1 Mbit/s and 2 Mbit/s data rates, respectively.

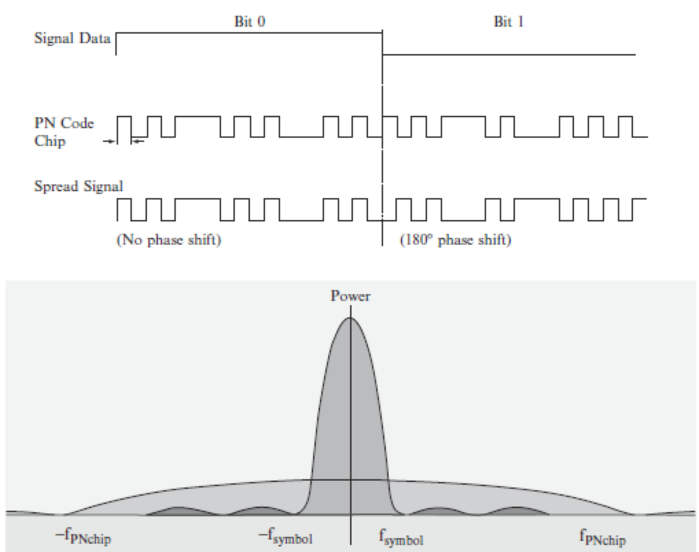
IEEE 802.11-1999 § 15.1 (1999) (emphasis added).

71. Further, the Newell '421 Products, through their implementation of mandatory sections of the IEEE 802.11b standard, receive a DSSS signal and then subtract the DSSS signal from a higher frequency signal (PN Chip Code) to produce DSSS signal frequency spectrum inversion as shown in the below excerpt discussing receipt of a DSSS signal.

14.2 Direct Sequence Spread Spectrum

There are several methods to perform frequency spreading. The method employed in CDMA is known as direct sequence spread spectrum. In direct sequence, the digital data is modulated by a much higher rate sequence of PN data. Each bit of the PN sequence is a "chip," and the higher rate is known as the chip rate. These chips typically modulate the much lower rate digital input data by a 180-degree phase shift in the carrier at the chip rate.

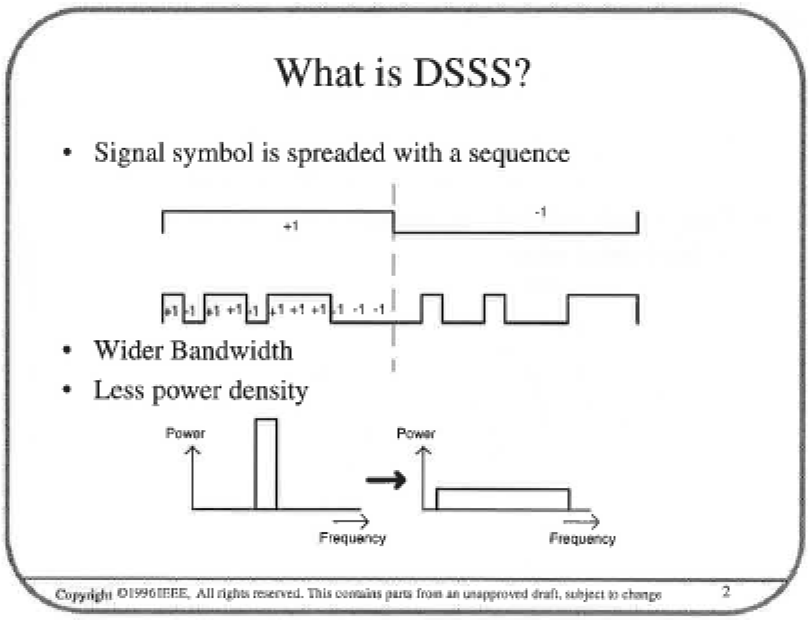
The chip rate phase changes are superimposed on the much lower rate phase shifts caused by input data (see Figure 14.2). The higher rate chip phase changes will greatly increase the occupied frequency bandwidth of the signal, and decrease the concentration of signal energy around the carrier.



Michael Parker, DIGITAL SIGNAL PROCESSING 101 at 152 (2010) (emphasis added).

72. The Newell '421 Products contain functionality for modulating a received signal by a higher rate sequence of pseudo-noise data. The higher rate sequence of pseudo-noise data is known as the chip rate. By modulating the data using the higher rate sequence pseudo-noise data,

the bandwidth frequency is increased. At the receiver, this process is reversed and the higher chip rate is used to despread the signal data and identify the carrier frequency. The Newell '421 Products are able to reverse the frequency bandwidth of the signal and concentrate the signal energy around the previously suppressed carrier frequency. The process used by Newell '421 Products is shown in the below excerpt from documentation from the IEEE 802.11 Working Group for WLAN Standards.



Jan Boer, *Direct Sequence Spread Spectrum Physical Layer Specification IEEE 802.11,* IEEE P802.11-96/49E at 1 (March 1996).

73. Frequency inversion is applied by the Newell '421 Products to a DSSS signal containing a PHY Preamble with SYNC and SFD fields. Specifically, the DSSS signal received by the Newell '421 Products are comprised of Physical Protocol Data Units ("PPDU") that are DSSS modulated. The PPDUs that are received include a PHY Preamble that is transmitted using 1 Mb/s DBPSK modulation. *See* IEEE Std 802.11-2016 § 15.3.3.1 (2016) ("The entire PHY preamble and header shall be transmitted using the 1 Mb/s DBPSK modulation"). The Newell '421 Products are enabled to receive both Long PPDU Format and Short PPDU Format signals.

Both signals have PHY Preambles that are encoded using DBPSK modulation. *See* IEEE Std 802.11-2016 § 16.2.2.2 (2016) (identifying that the Long PPDU has a PHY Preamble modulated at 1 Mb/s DBPSK with a SYNC field of 128 bits) and IEEE Std 802.11-2016 § 16.2.2.3 (2016) (identifying that the Short PPDU has a PHY Preamble modulated at 1 Mb/s DBPSK with a shortSYNC field of 55 bits).

74. The Newell '421 Products, through implementation of mandatory sections of the IEEE 802.11b standard, perform the step of correlating the inverted and non-inverted DSSS signals at substantially zero relative time delay. The Newell '421 Products receive DSSS signals containing a PLCP Preamble that is encoded using either DBPSK or DQPSK modulation. The PLCP Preamble is a DSSS signal that consists of a Synchronization Field and Start Frame delimiter field. The Synchronization Field is "provided so the receiver [Newell '421 Products] can perform the necessary operations for synchronization." IEEE STD 802.11-2016 at § 15.3.3.2.

75. The detection of the carrier frequency is performed by the Newell '421 Products by receiving a DSSS signal in the form of a Physical Protocol Data Unit ("PPDU"). The PPDU is then demodulated using frequency inversion. The preamble of the PPDU (the PLCP or PHY Preamble) is then used to determine the carrier frequency by allowing the Newell '421 Products to identify the radio channel which contains a center frequency. The below excerpt from a 2013 book discussing IEEE 802.11b states: "PLCP Preamble: It is a 144-bit preamble and it forms from a SYNC field and SYNC Field Delimiter, used for synchronization to determine a radio channel."

PPDU

PLCP preamble		PLCP header				Payload
Synchronisation	SFD	Signal	Service	Length	HEC	Variable

Fig. 14.15 *802.11b DSSS PHY layer packet format*

PLCP Preamble It is a 144-bit preamble and it forms from a SYNC field and SYNC Field Delimiter, used for synchronization to determine a radio channel and to establish CCA. This is PHY dependent, and includes the following fields:

SYNC It is 128-bit sequence of alternating zeros and ones, which is used by the PHY circuitry to select the appropriate antenna (if diversity is used), and to reach steady-state frequency offset correction and synchronization with the received packet timing.

Iti Saha Misra, WIRELESS COMMUNICATIONS AND NETWORKS – 3G AND BEYOND at 412 (2013) (describing IEEE 802.11 PHY Sub-layers).

76. The PLCP Preamble containing the SYNC field is used by the Newell '421 Products to generate the correlation signal.

> The down converted I and Q signals are applied to matched filter or correlation detectors. These circuits correlate the Baker sequence with the input signal and output an analog signal that represents the degree of correlation. . . the process of dispreading the input signal by correlating it with the stored spreading sequence requires synchronization of the receiver with transmitter timing and frequency. To facilitate this, the transmitted frame starts with a synchronization field (SYNC), shown at the beginning of the physical layer protocol data unit.

Alan Bensky, COMMUNICATIONS ENGINEERING DESK REFERENCE – CHAPTER 5.2 SHORT-RANGE WIRELESS APPLICATIONS AND TECHNOLOGIES at 419 (2009) (emphasis added).

77. The Newell '421 Products are available to businesses and individuals throughout the United States.

78. The Newell '421 Products are provided to businesses and individuals located in the Western District of Texas.

79. In compliance with the IEEE 802.11b standard, the Newell '421 Products perform the correlation of the inverted and non-inverted DSSS signals at substantially zero relative time delay. Specifically, the IEEE 802.11b standard requires that the transmission to reception

turnaround time is less than 10 µsec (i.e., 0.00001 seconds) which is substantially zero relative time delay.

15.4.4.7 TX-to-RX turnaround time

The TX-to-RX turnaround time shall be less than 10 µs, including the power-down ramp specified in 15.4.5.8.

The TX-to-RX turnaround time shall be measured on the WM from the trailing edge of the last transmitted symbol to valid CCA detection of the incoming signal. The CCA should occur within 25 µs (10 µs for turnaround time plus 15 µs for energy detect) or by the next slot boundary occurring after 25 µs has elapsed (refer to 15.4.6.5). A receiver input signal 3 dB above the ED threshold described in 15.4.6.5 shall be present at the receiver.

IEEE STD 802.11-2016 § 15.4.4.7 (2016) (emphasis added).

80. The receive to transmit turnaround time for the Newell '421 Products in correlating the inverted and non-inverted DSSS signals is less than or equal to 5 µsec (i.e., 0.000005 seconds), which is substantially zero relative time delay.

15.4.4.8 RX-to-TX turnaround time

The RX-to-TX turnaround time shall be measured at the MAC/PHY interface, using the PHY-TXSTART.request primitive and shall be ≤ 5 µs. This includes the transmit power-on ramp described in 15.4.5.8.

IEEE STD 802.11-2016 § 15.4.4.8 (2016) (emphasis added).

81. The Newell '421 Products identify the carrier frequency from the correlation signal. The correlation signal is used to select the channel frequency for one of 11 channels each of which have a specific channel center frequency as required by the IEEE 802.11b standard that the Newell '421 Products comply with.

A conformant PMD implementation shall be able to select the carrier frequency (F_c) from the full geographic-specific set of available carrier frequencies. Table 36 summarizes these frequencies for a number of geographic locations.

Table 36—Operating frequency range

Lower Limit	Upper limit	Regulatory range	Geography
2.402 GHz	2.480 GHz	2.400–2.4835 GHz	North America
2.402 GHz	2.480 GHz	2.400–2.4835 GHz	Europe[a]
2.473 GHz	2.495 GHz	2.471–2.497 GHz	Japan
2.447 GHz	2.473 GHz	2.445–2.475 GHz	Spain
2.448 GHz	2.482 GHz	2.4465–2.4835 GHz	France
NOTE—The frequency ranges in this table are subject to the geographic-specific regulatory authorities.			

[a]Excluding Spain and France.

IEEE STD 802.11-1999 at 173 (1999) (emphasis added).

82. The Newell '421 Products use complementary code keying to modulate and demodulate data. A direct spread spectrum signal transmitted at either 5.5 Mbit/s or 11 Mbit/s is received by the Newell '421 Products.

83. The Newell '421 Products enable the identification of a carrier wave from a spectral range between 2.400–2.4835 GHz.

84. The DSSS carrier frequency that the Newell '421 Products identify can be any of the following channels shown in the table below per the IEEE 802.11b standard. Only channels 1-11 are used in the United States per FCC regulations.

The channel center frequencies and CHNL_ID numbers shall be as shown in Table 64. The FCC (US), IC (Canada), and ETSI (Europe) specify operation from 2.4 GHz to 2.4835 GHz. For MKK (Japan), operation is specified as 2.471 GHz to 2.497 GHz. France allows operation from 2.4465 GHz to 2.4835 GHz, and Spain allows operation from 2.445 GHz to 2.475 GHz. For each supported regulatory domain, all channels in Table 64 marked with "X" shall be supported.

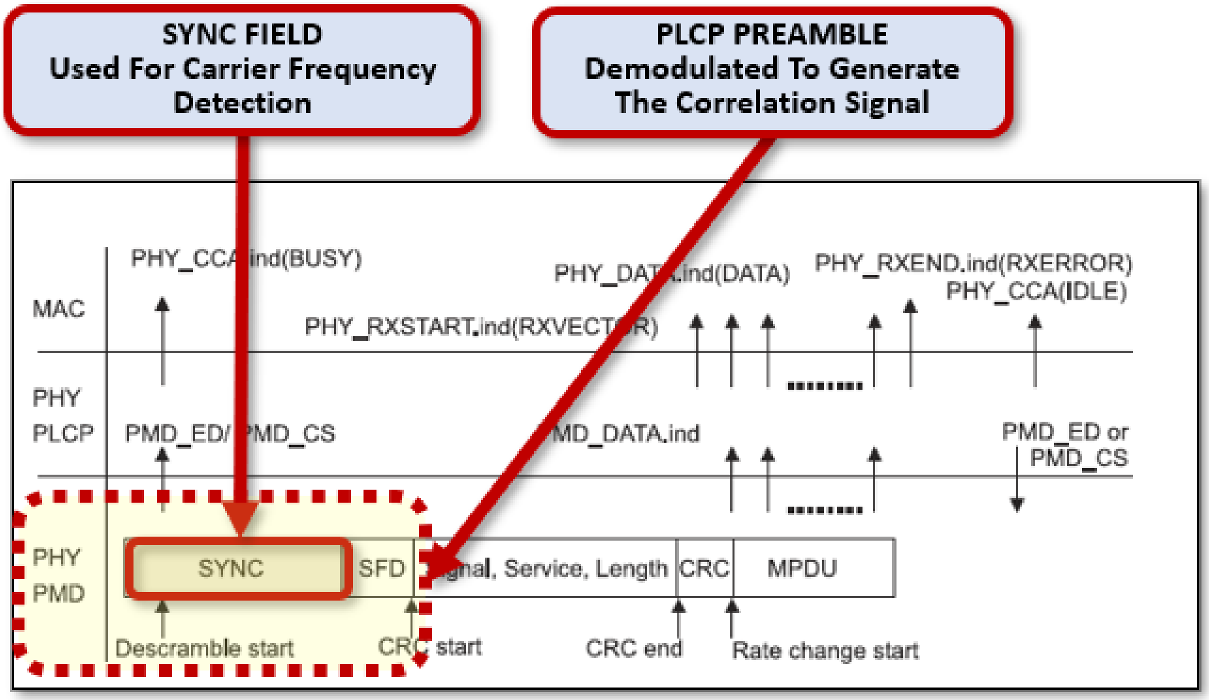
Table 64—DSSS PHY frequency channel plan

		Regulatory domains					
CHNL_ID	Frequency	X'10' FCC	X'20' IC	X'30' ETSI	X'31' Spain	X'32' France	X'40' MKK
1	2412 MHz	X	X	X	—	—	—
2	2417 MHz	X	X	X	—	—	—
3	2422 MHz	X	X	X	—	—	—
4	2427 MHz	X	X	X	—	—	—
5	2432 MHz	X	X	X	—	—	—
6	2437 MHz	X	X	X	—	—	—
7	2442 MHz	X	X	X	—	—	—
8	2447 MHz	X	X	X	—	—	—
9	2452 MHz	X	X	X	—	—	—
10	2457 MHz	X	X	X	X	X	—
11	2462 MHz	X	X	X	X	X	—
12	2467 MHz	—	—	X	—	X	—
13	2472 MHz	—	—	X	—	X	—
14	2484 MHz	—	—	—	—	—	X

CARRIER FREQUENCIES
The Channel Center Frequencies Detected Using The Correlation Signal

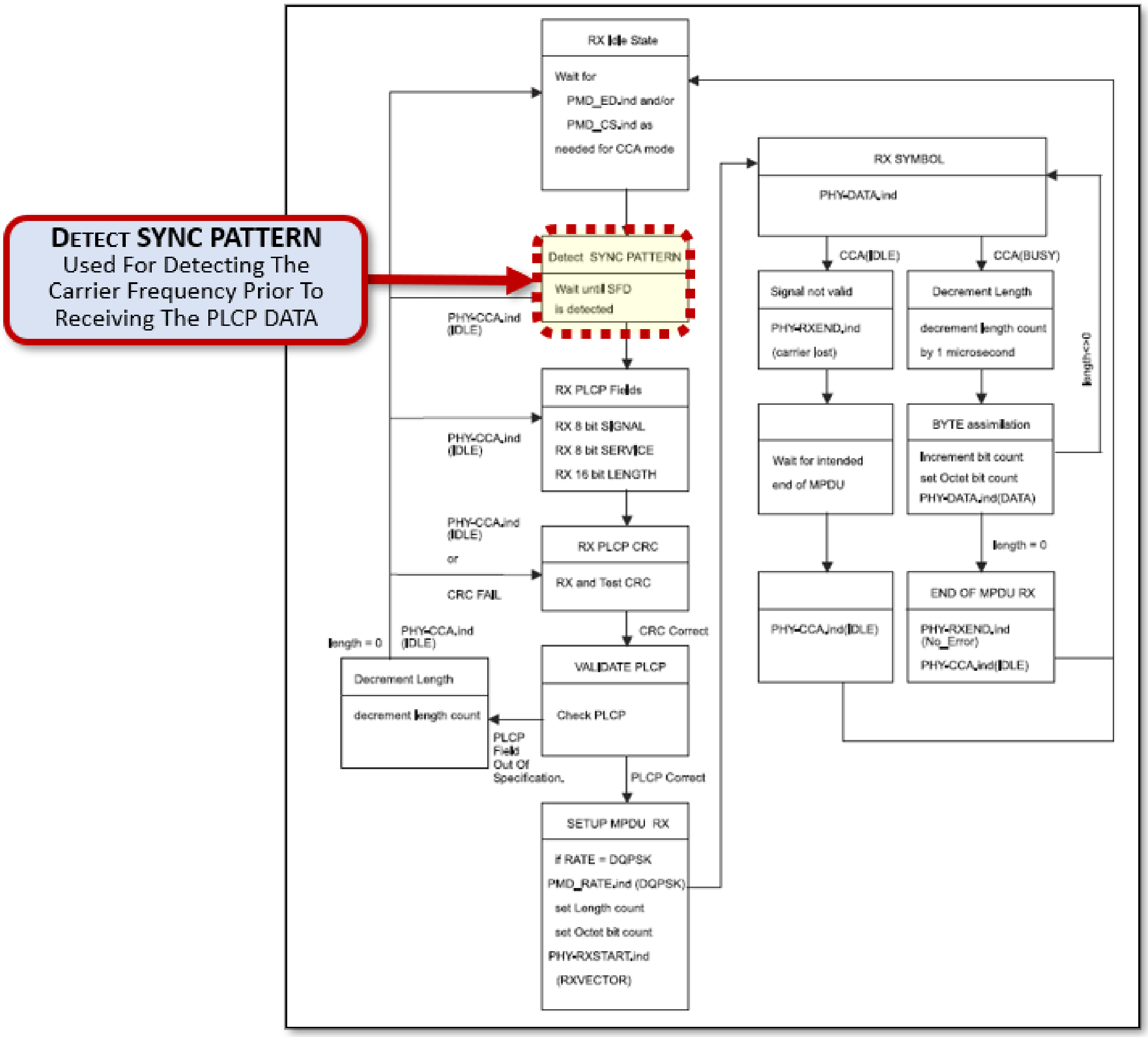
IEEE STD 802.11-1999 at 216 (1999) (annotation added).

85. The following excerpt from the IEEE 802.11b standard shows the use of the SYNC field in the PLCP Preamble to generate the correlation signal that is used by the Newell '421 Products to detect the carrier frequency (the channel center frequency for the DSSS signal).



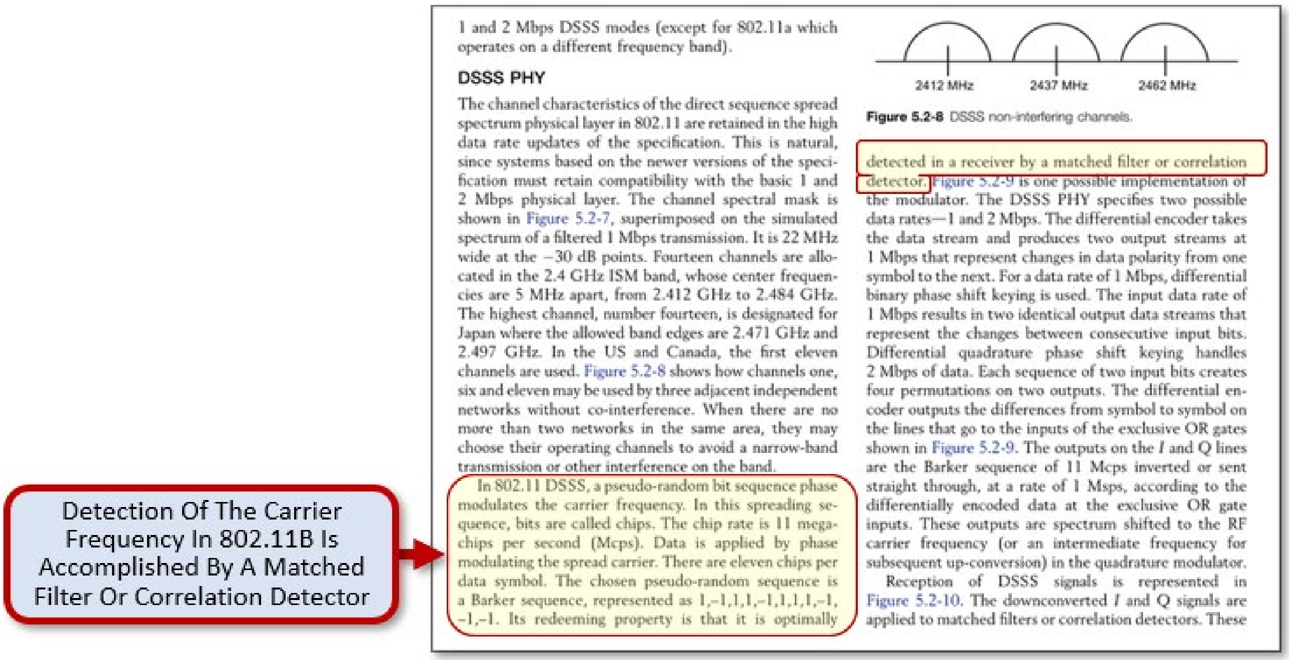
IEEE STD 802.11-1999 at 201 (1999) (annotation added).

86. The step of selecting the carrier frequency is accomplished by the Newell '421 Products following the receipt of the "SYNC" field which is identified in the following excerpt from the IEEE 802.11b standard as the receipt of the "TX SYNC PATTERN."



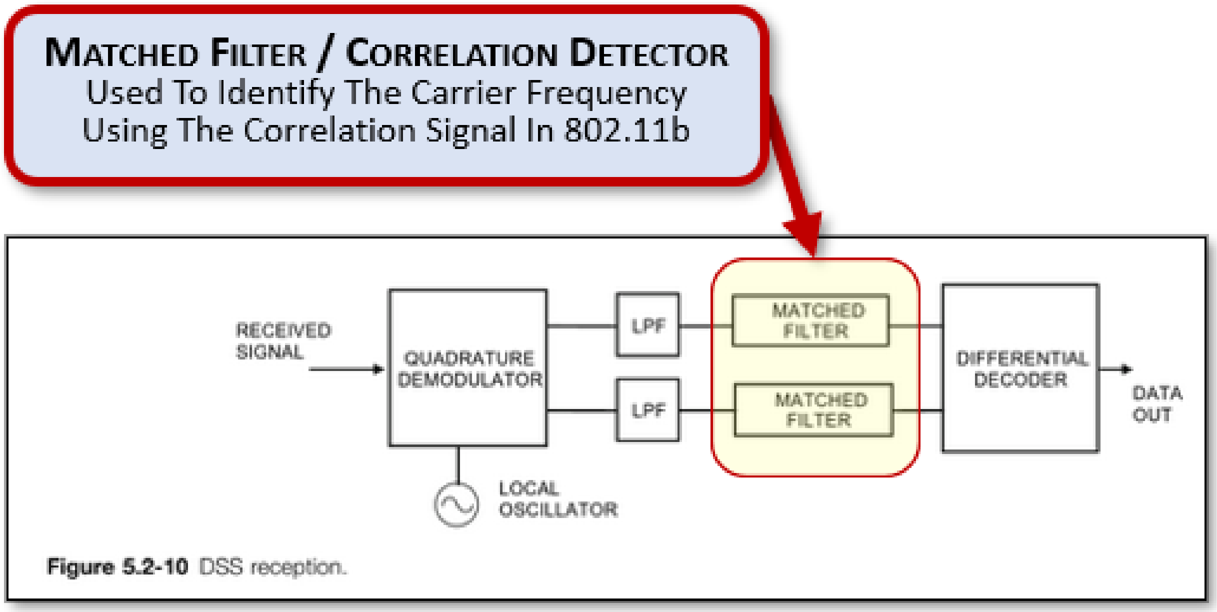
IEEE STD 802.11-1999 at 203 (1999) (annotation added).

87. The Newell '421 Products, in conformance with the 802.11b standard, detect the carrier frequency by using a matched filter or correlation detector. "In 802.11 DSSS, a pseudo-random bit sequence phase modulated the carrier frequency. In this spreading sequence, bits are called chips. The chip rate is 11 megachips per second (Mcps). Data is applied by phase modulating the spread carrier. . . . Its redeeming property is that it is optimally detected in a receiver by a matched filter or correlation detector."



Alan Bensky, COMMUNICATIONS ENGINEERING DESK REFERENCE – CHAPTER 5.2 SHORT-RANGE WIRELESS APPLICATIONS AND TECHNOLOGIES at 419 (2009) (annotation added).

88. The following figure shows the DSSS signal is received by the Newell ‘421 Products in conformance with the 802.11b standard and a correlation signal is generated that is used to identify the carrier frequency. The accompanying text states, “Reception of DSSS signals is represented in Figure 5.2.10. The down converted I and Q signals are applied to matched filter or correlation detectors. These circuits correlate the Baker sequence with the input signal and output an analog <u>signal that represents the degree of correlation.</u> . . the process of dispreading the input signal by correlating it with the stored spreading sequence requires synchronization of the receiver with transmitter timing and frequency. To facilitate this, the transmitted frame starts with a synchronization field (SYNC), shown at the beginning of the physical layer protocol data unit.” *See* Alan Bensky, COMMUNICATIONS ENGINEERING DESK REFERENCE – CHAPTER 5.2 SHORT-RANGE WIRELESS APPLICATIONS AND TECHNOLOGIES at 419 (2009) (emphasis added).



Alan Bensky, COMMUNICATIONS ENGINEERING DESK REFERENCE – CHAPTER 5.2 SHORT-RANGE WIRELESS APPLICATIONS AND TECHNOLOGIES at 421 (2009) (annotation added).

89. By making, using, testing, importing, offering for sale, and/or selling products and services for identifying a carrier frequency from a correlation signal, including but not limited to the Newell '421 Products, Newell has injured Castlemorton and is liable to the Plaintiff for directly infringing one or more claims of the '421 patent, including at least claim 6 pursuant to 35 U.S.C. § 271(a).

90. The Newell also indirectly infringes the '421 patent by actively inducing infringement under 35 USC § 271(b).

91. Newell has had knowledge of the '421 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Newell knew of the '421 patent and knew of its infringement, including by way of this lawsuit.

92. Newell intended to induce patent infringement by third-party customers and users of the Newell '421 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Newell

specifically intended and was aware that the normal and customary use of the accused products would infringe the '421 patent. Newell performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the '421 patent and with the knowledge that the induced acts would constitute infringement. For example, Newell provides the Newell '421 Products that have the capability of operating in a manner that infringe one or more of the claims of the '421 patent, including at least claim 6, and Newell further provides documentation and training materials that cause customers and end users of the Newell '421 Products to utilize the products in a manner that directly infringe one or more claims of the '421 patent.[39] By providing instruction and training to customers and end-users on how to use the Newell '421 Products in a manner that directly infringes one or more claims of the '421 patent, including at least claim 6, Newell specifically intended to induce infringement of the '421 patent. On information and belief, Newell engaged in such inducement to promote the sales of the Newell '421 Products, *e.g.*, through Newell user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '421 patent. Accordingly, Newell has induced and continues to induce users of the accused products to use the

[39] *See e.g., How To Install Onelink Safe & Sound,* FIRSTALERTSAFETY YOUTUBE.COM CHANNEL (June 14, 2018), *available at*: https://www.youtube.com/watch?v=o3FU92n2UgQ; *First Alert Onelink Wi-Fi Smoke + Carbon Monoxide Alarm User's Manual Model: DC10-500*, FIRST ALERT ONELINK DOCUMENTATION (2015); *First Alert Onelink Secure Connect Wi-Fi Mesh Tri-Band Solution Features*, FIRST ALERT ONELINK DOCUMENTATION (2019); *First Alert Onelink Wi-Fi Environment Monitor User's Manual Model: GLOCO-500*, FIRST ALERT ONELINK DOCUMENTATION (2016); *First Alert Onelink Smart Smoke & Carbon Monoxide Alarm User's Manual Model: 1042135,* FIRST ALERT ONELINK DOCUMENTATION (2018); *Luma User Guide – Experience Surround Wifi,* LUMA DOCUMENTATION (2016); FIRST ALERT ONELINK OWNER'S MANUAL & INSTALLATION GUIDE MODEL THERM-500 (2014); *First Alert Onelink Secure Connect Wi-Fi Mesh Dual-Band Solution Features*, FIRST ALERT ONELINK DOCUMENTATION (2019); *Onelink Secure Connect Video,* FIRSTALERTSAFETY YOUTUBE.COM CHANNEL (January 8, 2019), *available at*: https://www.youtube.com/watch?v=DsQVUigOhng; *First Alert Onelink Wi-Fi Smoke + Carbon Monoxide Alarm User's Manual Model: AC10-500*, FIRST ALERT ONELINK DOCUMENTATION (2015); and *First Alert Onelink Smart Smoke & Carbon Monoxide Alarm User's Manual Model: 1042136,* FIRST ALERT ONELINK DOCUMENTATION (2018).

accused products in their ordinary and customary way to infringe the ‘421 patent, knowing that such use constitutes infringement of the ‘421 patent.

93. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘421 patent.

94. As a result of Newell’s infringement of the ‘421 patent, Castlemorton has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Newell’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Newell together with interest and costs as fixed by the Court.

PRAYER FOR RELIEF

WHEREFORE, Castlemorton respectfully requests that this Court enter:

A. A judgment in favor of Castlemorton that Newell has infringed, either literally and/or under the doctrine of equivalents, the ‘421 patent;

B. An award of damages resulting from Newell’s acts of infringement in accordance with 35 U.S.C. § 284;

C. Any and all other relief to which Castlemorton may show themselves to be entitled.

JURY TRIAL DEMANDED

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Castlemorton Wireless, LLC requests a trial by jury of any issues so triable by right.

Dated: January 14, 2021

Respectfully submitted,

/s/ *Daniel P. Hipskind*
Elizabeth L. DeRieux
State Bar No. 05770585
Capshaw DeRieux, LLP
114 E. Commerce Ave.
Gladewater, TX 75647
Telephone: (903)235-2833
Email: ederieux@capshawlaw.com

Dorian S. Berger (CA SB No. 264424)
Daniel P. Hipskind (CA SB No. 266763)
BERGER & HIPSKIND LLP
9538 Brighton Way, Ste. 320
Beverly Hills, CA 90210
Telephone: 323-886-3430
Facsimile: 323-978-5508
E-mail: dsb@bergerhipskind.com
E-mail: dph@bergerhipskind.com

Attorneys for Castlemorton Wireless, LLC